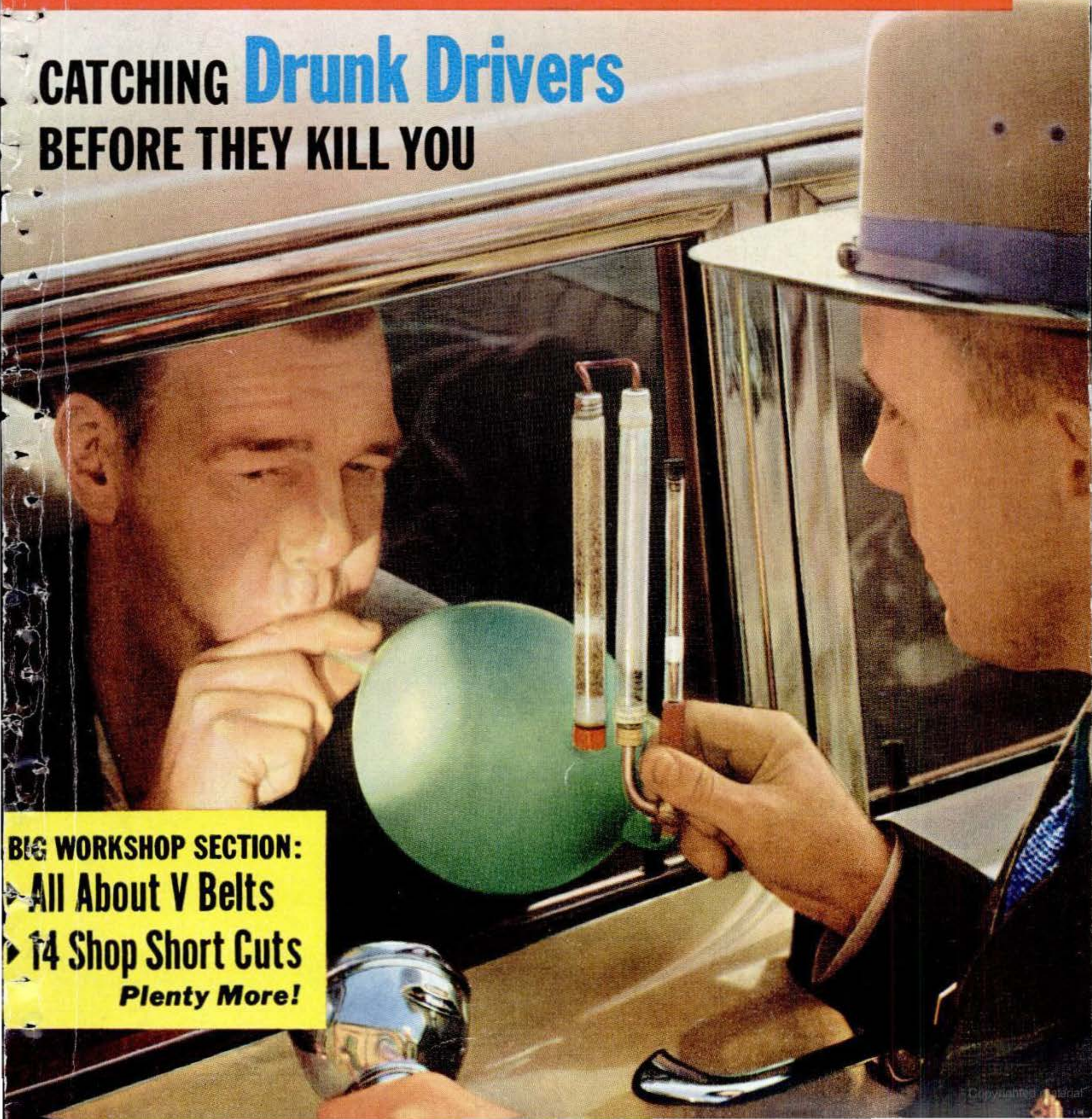
Secrets of Making Your Inventions Pay

# POPULAR SCIENCE

MARCH · 35c *Monthly*



## CATCHING Drunk Drivers BEFORE THEY KILL YOU

**BIG WORKSHOP SECTION:**

- All About V Belts
- 14 Shop Short Cuts

***Plenty More!***

# WELCOME TO YOUR EVINRUDE DEALER'S FUN AFLOAT SHOW!

GETTING WEARY OF WINTER? Looking forward to fishing? Can't wait to go swimming, water skiing . . . or cruising? Making plans for camping, picture taking, and exploring?

SPRING IS HERE NOW . . . at your Evinrude dealer's. He's putting final touches on his gala FUN AFLOAT SHOW . . . an exciting new kind of boat show that demonstrates the wonderful ways you and your family can enjoy a new kind of vacation living . . . *on a budget!*

You'll see not only the newest boats and motors . . . but fun equipment for skiing, cruising, fishing, skin diving, and camping. You'll get expert advice on how to broaden the horizon of your own favorite hobby or sport . . . and exactly how little it takes to do it!

You don't have to be a millionaire to live like one . . . and the best way to find out is to visit your Evinrude dealer's FUN AFLOAT SHOW . . . to be announced locally by your Evinrude dealer soon!

FREE—EVINRUDE FUN GUIDE! All the wonderful ways to enjoy leisure living afloat. Ask for it at your nearest Evinrude dealer—or write: Evinrude Motors, 4146 N. 27th St., Milwaukee 16, Wisconsin. (*In Canada: Peterborough, Ont.*) *A Division of Outboard Marine Corporation.*

**EVINRUDE** FIRST IN OUTBOARDS

Copyrighted material

# YOU'RE OFF to a thrilling adventure in the wonderful world of SUBMARINES!

**YOURS** *for only* **10¢**
WITH TRIAL MEMBERSHIP

A Complete Sample Activity Kit to Acquaint You With

**THE SCIENCE PROGRAM**

*Plus* This Scale Model of the Famous POLARIS Missile-Firing Submarine

S.S.B. (N.) 598 **GEORGE WASHINGTON**

*AN AUTHENTIC 18-INCH WORKING MODEL WITH POLARIS MISSILES THAT ACTUALLY FIRE!*

***As New as Today's Headlines!***

Includes ALL these special features: • POLARIS missiles that FIRE • PERISCOPE slides UP and DOWN • RUDDER moves • PROPELLER rotates —right half of hull snaps off revealing interior • 3 molded colors • specially designed display stand • full-color decals.

***Why this generous offer? Simply to introduce you to an exciting new way to understand and enjoy the scientific marvels all around us***

PREPARE TO SUBMERGE!" You're off on a great adventure through the underwater world of SUBMARINES.

You'll travel back to 1620 and board that first submarine, powered by . . . OARS! In a Confederate sub you'll ram a Union Ship. You'll cruise in the nuclear-powered *Nautilus*. A friendly expert will show you the atomic reactor, the radar and periscope in the Control and Attack Center. You will see why 7 million parts are needed for a single nuclear submarine.

AND FOR THE BIGGEST THRILL OF ALL, you'll stalk the "enemy" in the newest and mightiest submarine of all, the missile-firing *George Washington!* You'll stand breathless at the command to launch the Polaris missile . . . cheer as it lands *on target 1,200 miles away!* These are just a few of the thrills that await you—in the new Science Program presentation of SUBMARINES. And it's yours for only 10c on this "get-acquainted" offer.

### *Enjoy Monthly Adventures Like These*

Each month this new program will take you on a "guided tour" of a different field of science. One month a chemist will show you metal that burns and gas that pours. Another time a biologist will let you look through his microscope at a living cell. On other adventures your guides will be radio engineers . . . medical researchers . . . nuclear physicists.

Each month you receive sheets of full-color photographs—also an illustrated album, crammed with information, and with spaces for mounting the pictures. In addition, there will be many other interesting things-to-do.

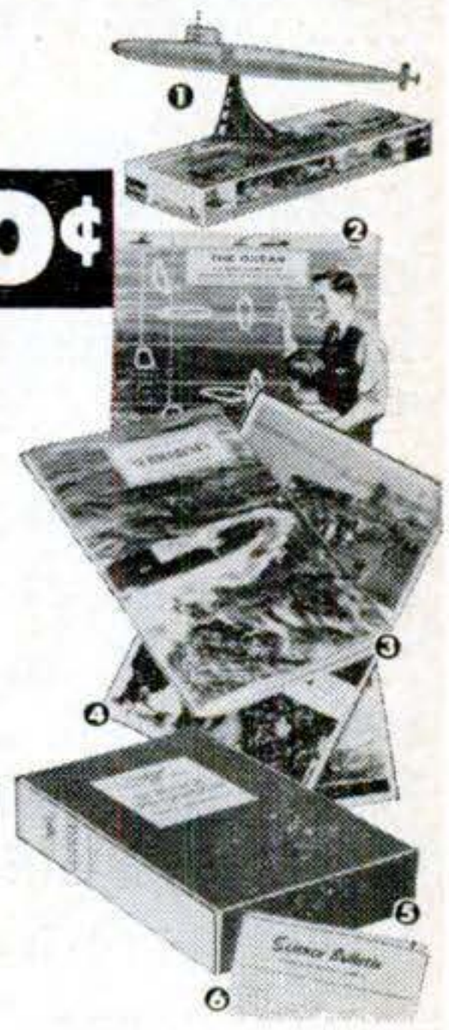
### *What It Will Mean to Your Family*

Think what these adventures will mean to your family—especially if you have children in school! It will help them participate in science projects, help prepare them for life in the space age—may even lead to a scientific career.

MAIL COUPON NOW with only 10c for the Introductory package. With it we will also send the current Activity Kit for which you will be billed only $1, plus shipping. No further obligation. If you do not wish to continue, simply write us within ten days. Otherwise you pay only $1 plus shipping for each month's scientific adventure. You may cancel at any time. Mail the coupon with only ten cents to

**SCIENCE PROGRAM, Dept. 1-PS-3, Garden City, N. Y.**

**YOU GET THESE SIX EXCITING ITEMS** *for only* **10¢**



1. Authentic 18" WORKING model (with stand) of Missile-Firing Submarine SSB *George Washington.*
2. Beautiful full-color prints of wonders of SUBMARINES.
3. 8,000-word illustrated album —crammed with information about Submarines, with spaces to mount the color prints.
4. Gummed full-color punch-outs of record depth achievements and Wall Chart of the Ocean on which to mount them.
5. Science Bulletin: Special monthly reports on the very newest scientific developments.
6. A handsome pull-drawer library case to hold several albums.

**SCIENCE PROGRAM, Dept. 1-PS-3**
**Garden City, N. Y.**

I enclose 10¢ to help cover shipping. Please rush me my introductory package described here. Also enroll me as a member of the Science Program and send the current Activity Kit with a bill for only $1 plus shipping.

After examining this package, I may cancel membership simply by writing you within 10 days. In this case I may return everything and owe nothing. As a member I will receive a new Activity Kit every month for only $1 each plus shipping. I do not have to take any minimum number of future Kits, and may resign any time I wish.

Name .....
(Please Print Plainly)

Address .....

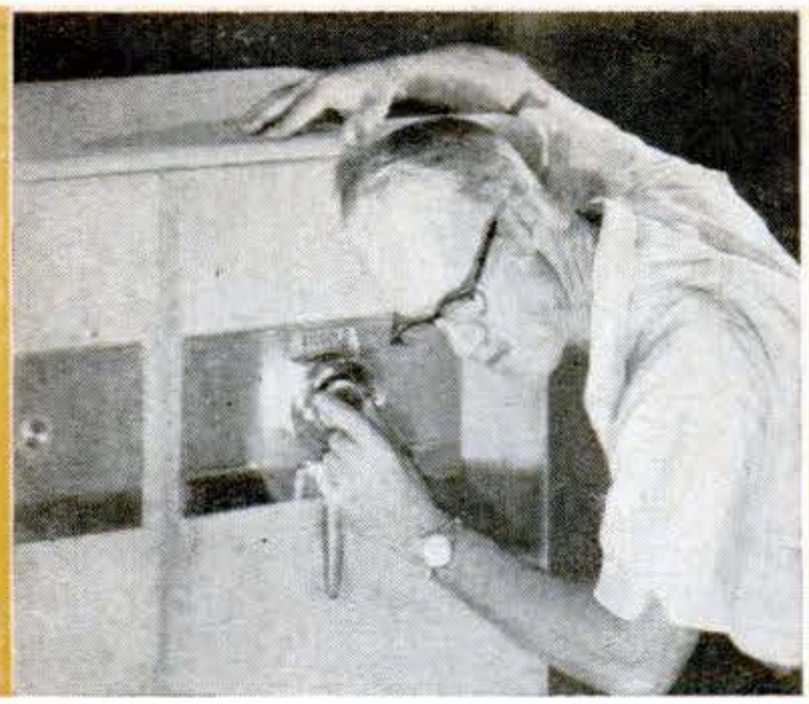
City .....Zone....State.....

*(Same offer in Canada. 105 Bond St., Toronto 2. Offer good only in U.S.A. and Canada)*

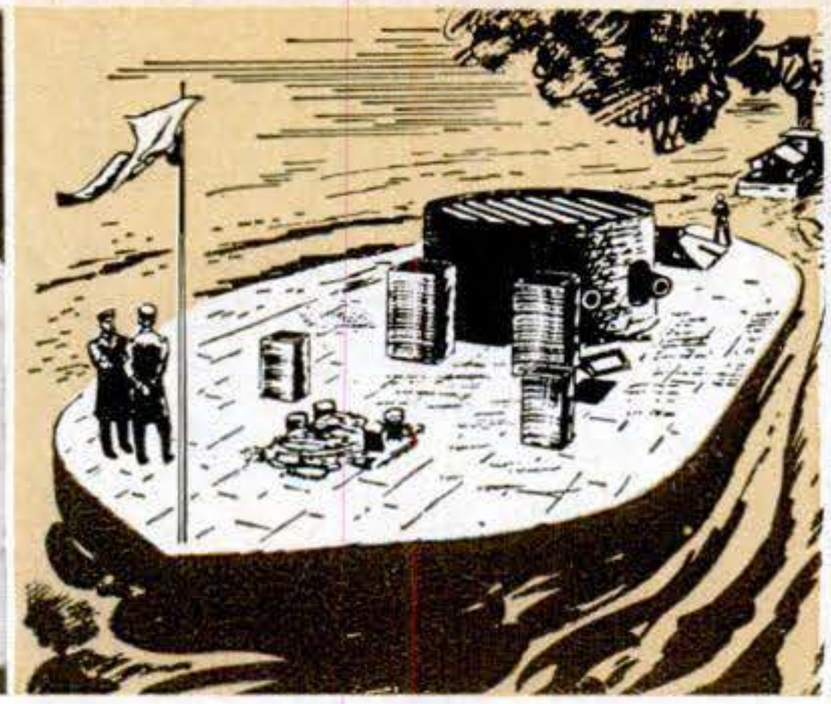
SC17B

Copyrighted material

CONTENTS



**Safecracking:** *It can be honest work, too.* P. 88



**Monitor:** *The iron ship that saved the Union blockade.* P. 72

**Chopper.** *It turns trees into pulpwood.* P. 92

*Founded in 1872 Vol. 178 No. 3* *Mechanics and Handicraft* REG. U. S. PAT. OFF.

# Popular Science

**March, 1961**

*Cover photo by W. W. Morris and R. D. Borst*

## SPECIAL FEATURES

History's Strangest Warship..... 72
Cracking Safes for a Living..... 88
Ticklish Job of Air Refueling..... 98
They Bait Their Nets for Junk....106
9 Hints for Better Boating.....144

## CARS AND DRIVING

Catching Drunk Drivers..... 59
Knee-Pressure Steers This Car..... 64
10,000 Miles in a Lancer..... 78

## SCIENCE AND INDUSTRY

Giant Kettle Desalts the Sea..... 66
Model Runs to Test Big Trains.... 84
Science Laboratory on Wheels..... 86
How a Self-Winding Watch Works 96
In Front of a Shotgun Blast.....110
Why People Walk in Their Sleep..126

## DISCOVERIES AND INVENTIONS

Tree Chopper Cuts 'Em to Size.... 92
What Should You Invent?.....112
Biggest Paver Has Three Bellies..118

## CONSUMER NEWS

What's New? .....122
Shop Report: Maximat Lathe.....152
Solid Wood in Big Panels.....163

## PICTURE NEWS

Jet Does Down-to-Earth Job..... 70
Newest Slot Machine..... 77
He Carries Air on His Back..... 87
Sub-Launched Landing Craft..... 95
Lets the Sun Heat His House.....104
Stopping Speed in Its Tracks.....111
Fly-Off, Fly-On Sea Freight.....117

**Editor** HOWARD ALLAWAY

**Assistant Managing Editors**
Kendall W. Goodwyn, Robert P. Stevenson
**Senior Editors**
Alden P. Armagnac, Devon Francis
Martin Mann, Everett H. Ortner
**Technical Editor**
Hubert Luckett
**Detroit Editor**
Ken Fermoyle
**West Coast Editor**
Wesley S. Griswold

**Managing Editor** FRANK ROWSOME JR.

**Associate Editors**
Frank Dorr, Sheldon M. Gallager
Herbert O. Johansen, Alfred W. Lees
Alex Markovich, Herbert R. Pfister
Joan Steen, Ruth Westphal

**Editorial Assistants**
Rosa Lee Beeland (Chief), Anna Dallas
Wanda H. Joseph, Georgette Sparks
Dorothy Zallen

**Art Director** HOWARD C. JENSEN

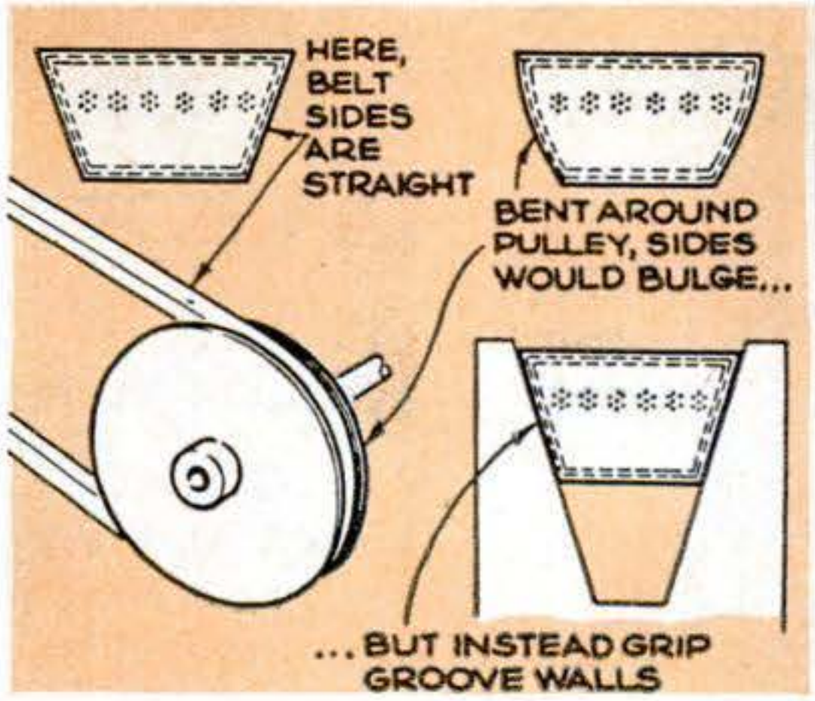
**Art Editors**
Herbert Anthony, Reginald A. Hawley
Harry Samuels
**Art Associates**
Eric A. Karminski Jr.
Henry W. Kazmirowski, Richard J. Meyer
**Photography**
W. W. Morris (Chief)
Robert D. Borst, Eugene Colangelo

EDITORIAL OFFICES: 355 Lexington Ave., New York 17, N. Y.

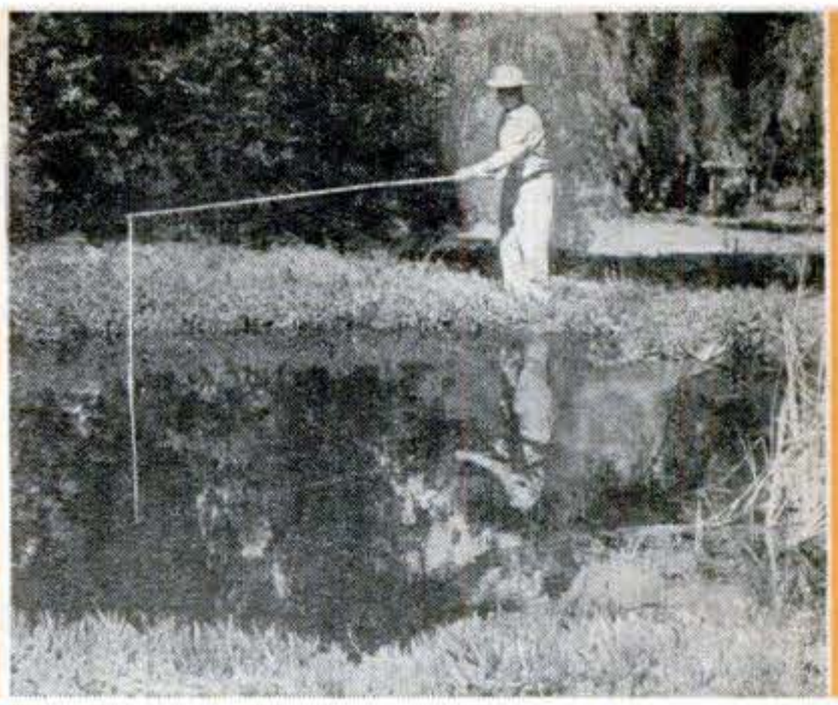


Copyrighted material

**High flyer.** *No fuel—batteries run it.* *P. 129*




**V belts:** *A cinch to use if you use them right.* *P. 135*



**Fishing:** *In your own back yard? Here's how.* *P. 146*

CONTENTS

# Monthly®

**America's NEW-IDEA MAGAZINE for 89 Years**

## HOME AND SHOP


Flying Electric-Prop Planes.....129
Save-It File: V Belts.....135
Motor Trike Roams the Hills.....143
I Fish in My Back Yard.....146
My Amazing Lean-To Scaffold.....148
Short Cuts to Faster Shopwork....156
A Lathe-Turned Jewel Box.....160
Magnets by the Yard.....167
What's Your Mechanical IQ?.....183
Radio Controls for the Savannah..185
Electric Motor to Drive Model..188
Short Cuts for the Camera Man....190
Embarrassing Shop Moment.....191
Putting Electric Eyes to Work.....192
Old-Timer's Finishing Formula....196


## AUTO UPKEEP


Hints from the Model Garage.....205
Gus Meets with Resistance.....210


## SHORT CUTS AND TIPS


Three-Way Emergency Light.....155
Jig Cuts Glass Accurately.....161
Signal Saves Trip to Mailbox.....162
New Faces for a Lead Hammer....165
Bar Signal for Night Latch.....166
Wrench Is Substitute Clamp.....166
Lap Board for Armchair.....183
Car Jack Makes a Bar Clamp.....183
Tumble-Drum Cleans Chains.....184
Guard Protects Plane Blade.....191
Clean-Up Basin from Sink.....202


## EVERY MONTH


PS Readers Talk Back..... 4
PS Puzzlers ..... 18
The Month in Science..... 23
Detroit Report ..... 56
I'd Like to See Them Make..... 91
New Ideas from the Inventors.....101
Wordless Workshop .....150



**Publisher** EUGENE S. DUFFIELD **Advertising Manager** LEE P. ADAMS **Circulation Director** EUGENE WATSON

ADVERTISING OFFICES:
NEW YORK—355 Lexington Ave.
CHICAGO—360 North Michigan Ave.
DETROIT—2810 Book Bldg.
SAN FRANCISCO—114 Sansome St.
CLEVELAND—636 B. F. Keith Bldg.
LOS ANGELES—711 South Vermont
PORTLAND, ORE.—520 S.W. Sixth Ave.

SUBSCRIPTION SERVICE:
Address all subscriptions and correspondence concerning them to: Popular Science Subscription Department, 355 Lexington Ave., New York 17, N. Y. Allow four weeks' notice for change of address. Please give both old and new addresses, including zone numbers. Published monthly at 355 Lexington Ave., New York 17, N.Y., by Popular Science Publishing Co., Inc., Godfrey Hammond, Chairman of the Board; Eugene S. Duffield, President; Franklin E. Parker Jr., Secretary; Eugene Watson, Vice-President; Robert D. Beals, Treasurer and Business Manager. Second-class postage paid at New York, N. Y., and at additional mailing offices. Entered as second class matter at the Post Office Department. Canada. Printed in U.S.A.


Copyright © 1961 by Popular Science Publishing Co., Inc. All rights reserved.


Single copy 35¢. Subscriptions to United States, its possessions, and Canada, 1 year $3.40 (2 years $6.00, 3 years $8.00). Elsewhere, 1 year $6.00 (2 years $11.00, 3 years $16.00). **Send notice of undelivered copies on Form 3579 to Popular Science Monthly, 355 Lexington Avenue, New York 17, N. Y.**





Copyrighted material

# PS Readers TALK BACK

### Hooking a Pickpocket

"How Pickpockets Pick Pockets" [Dec.] reminds me of a country yokel who had his pocket picked when he went to the county fair. He was smarter than he appeared to be and before going to the fair again, he carefully sewed fishhooks around the inside edge of his hip pocket. Then he put his wallet, stuffed with paper, in the pocket horizontally so a pickpocket would have to dig deep. At the fair, it wasn't long before he'd caught, and had in painful tow, what was known in those days as a grifter.

JOSEPH OTT, Barto, Pa.

### No Detroit in New Zealand

I AM an avid reader of PS although your American nomenclature often puzzles me. And your new-car articles hardly apply to a New Zealander.

Autos aren't junked here until they are over 30 years old, unless wrecked. Model A Fords, greatly in use, sell for about half new price. Ten years ago I sold a 1930 Model A Tourer, the engine once rebored, for better than new price. We have a motor vehicle for every 4.3 persons and all vehicles must pass a mechanical-fitness test every six months.

One of my office colleagues drove a 1923 Columbia four miles to work every day and kept it going by buying another one for parts. He recently graduated to a '29 Chevy; also runs a Morris 8. Another fellow drives a '34 Chrysler Airflow. He spent $600 on the motor alone recently. The cheapest Chevrolet, made in Canada and assembled in New Zealand, costs $6,000—about three years' wages. That's why we have to make them last.

KEN JAMIESON, Wanganui East, N. Z.

### No Smoke, No Soot, No Electricity

WE AT Iron Fireman Manufacturing Co. were much pleased by the attention given to our new Custom Mark II furnace and boiler in the article "No Flame, No Smoke, No Chimney" in your November issue.

This article, however, referred to both of these units as "electric," while actually they are oil-fired and constitute what many say is the most important development in home heating equipment in many years. Users report not only exceptional comfort but fuel savings of from 20 to 40 percent. This economy is due to the fact that these units give complete combustion of fuel, without smoke or soot, and operate without chimney draft.

H. M. CUTSHAW, General Sales Manager
Cleveland, Ohio.

### Look, Pop, No Tubes

THE letter about mysterious radio signals [Dec.] reminded me of an experience I had when radio first came in. I was using earphones at the time, and got up to answer the doorbell leaving them on. As I passed a table, the phone plug dragged across a bronze ash tray. I was amazed to hear the same musical program I'd tuned in on the set. I later applied the plug to the electric fixture and went on from there. The program was

coming in on everything metal in the house—including all the canned goods in the pantry.

FRANK JENNE, Poland, Ohio.

### Brakes for the Big Ships

I HAVE my doubts about the value of those drag anchors for ocean liners



CONTINUED

Copyrighted material

# "HOW A 'CRAZY RUMOR' GOT ME PROMOTED!"

**What I overheard one morning shook me right out of a rut!**

"Company's getting ready to cut back . . . bound to be layoffs," I heard them say. "Just another crazy rumor," I told myself.

Just the same, I took quick stock of myself that night. Came up with four good reasons why the company would keep me on:

*Three years' experience*
*Getting along with foreman*
*Turning out acceptable work*
*Prompt and dependable*

And four just-as-good reasons why they might let me go:

*Making no real headway*
*Others better qualified*
*Still rated "semi-skilled"*
*Needs special training*

I wasn't in trouble. But I sure wasn't "in solid" like I should be. That's when I made up my mind to enroll for training with I.C.S.

I picked I.C.S. because it's the oldest and largest with 257 courses. The training is quick and thorough. It's recognized by my company and accredited by the National Home Study Council. You study in your spare time and get personalized, practical instruction—know-how you can apply next day on the job.

That was a year ago. There have been two layoffs since then. While some of the others were just hanging on or being released, I was moving up. My I.C.S. training started something. Not only did it get me promoted (with a fat pay hike), but it put me in line for real advancement.

Don't wait for a "crazy rumor" to set *you* straight. Take out your "job insurance" right now. Mail the coupon and get full, free details on how I.C.S. has helped thousands, how it can help you. No obligation—and you get three valuable books *free!* (1) How to Succeed; (2) Catalog of opportunities in the field of your choice; (3) Sample lesson (math).

**For Real Job Security—Get an I. C. S. Diploma!** **I. C. S., Scranton 15, Penna.** **Accredited Member, National Home Study Council**

## INTERNATIONAL CORRESPONDENCE SCHOOLS

ICS

**BOX 73085C, SCRANTON 15, PENNA.** (In Hawaii, reply P.O. Box 418, Honolulu) (Partial list of courses)

Without cost or obligation, send me "HOW to SUCCEED" and the opportunity booklet about the field BEFORE which I have marked X (plus sample lesson):

**ARCHITECTURE and BUILDING CONSTRUCTION**
- ☐ Air Conditioning
- ☐ Architecture
- ☐ Arch. Drawing and Designing
- ☐ Building Contractor
- ☐ Building Estimator
- ☐ Carpenter Builder
- ☐ Carpentry and Millwork
- ☐ Heating
- ☐ Painting Contractor
- ☐ Plumbing
- ☐ Reading Arch. Blueprints

**ART**
- ☐ Commercial Art
- ☐ Magazine Illus.
- ☐ Sign Painting and Design'g
- ☐ Sketching and Painting

**AUTOMOTIVE**
- ☐ Automobile
- ☐ Auto Body Rebuilding and Refinishing
- ☐ Auto Engine Tuneup
- ☐ Auto Electrical Technician
- ☐ Diesel Engines

**AVIATION**
- ☐ Aero-Engineering Technology
- ☐ Aviation Engine Mech.
- ☐ Reading Aircraft Blueprints

**BUSINESS**
- ☐ Accounting
- ☐ Advertising
- ☐ Bookkeeping and Cost Accounting
- ☐ Business Administration
- ☐ Business Management
- ☐ Clerk Typist
- ☐ Creative Salesmanship
- ☐ Managing a Small Business
- ☐ Professional Secretary
- ☐ Public Accounting
- ☐ Purchasing Agent
- ☐ Real Estate Salesmanship
- ☐ Salesmanship
- ☐ Salesmanship and Management
- ☐ Traffic Management

**CHEMICAL**
- ☐ Analytical Chemistry
- ☐ Chemical Engineering
- ☐ Chem. Lab. Technician
- ☐ General Chemistry
- ☐ Oil Field Technology
- ☐ Pulp and Paper Making

**CIVIL ENGINEERING**
- ☐ Civil Engineering
- ☐ Construction Engineering
- ☐ Highway Engineering
- ☐ Professional Engineer (Civil)
- ☐ Reading Struc. Blueprints
- ☐ Sanitary Engineer
- ☐ Sewage Plant Operator
- ☐ Structural Engineering
- ☐ Surveying and Mapping
- ☐ Water Works Operator

**DRAFTING**
- ☐ Aircraft Drafting
- ☐ Architectural Drafting
- ☐ Drafting & Machine Design
- ☐ Electrical Drafting
- ☐ Electrical Engineer Drafting
- ☐ Industrial Piping Drafting
- ☐ Mechanical Drafting
- ☐ Sheet Metal Drafting

**ELECTRICAL**
- ☐ Electrical Appliance Servicing
- ☐ Electrical Engineering
- ☐ Electric Motor Repairman
- ☐ Elec. Engr. Technician
- ☐ Elec. Light and Power
- ☐ Practical Electrician
- ☐ Practical Lineman
- ☐ Professional Engineer

**HIGH SCHOOL**
- ☐ Good English
- ☐ High School Diploma
- ☐ High School General
- ☐ H. S. College Prep. (Eng'r'g & Science)
- ☐ High School Math
- ☐ High School Science
- ☐ Short Story Writing

**LEADERSHIP**
- ☐ Industrial Foremanship
- ☐ Industrial Supervision
- ☐ Personnel-Labor Relations
- ☐ Supervision

**MECHANICAL and SHOP**
- ☐ Diesel Engines
- ☐ Gas-Elec. Welding
- ☐ Heating and Air Conditioning
- ☐ Industrial Engineering
- ☐ Industrial Instrumentation
- ☐ Industrial Safety
- ☐ Machine Shop Practice
- ☐ Mechanical Engineering
- ☐ Plumbing and Heating
- ☐ Professional Engineer
- ☐ Quality Control
- ☐ Reading Shop Blueprints
- ☐ Refrigeration and Air Conditioning
- ☐ Tool Design ☐ Tool Making

**RADIO, TELEVISION**
- ☐ General Electronics Tech.
- ☐ Industrial Electronics
- ☐ Practical Radio-TV Eng'r'g
- ☐ Radio-TV Servicing
- ☐ TV Technician

**RAILROAD**
- ☐ General Railroad

**STEAM and DIESEL POWER**
- ☐ Combustion Engineering
- ☐ Power Plant Engineer
- ☐ Stationary Diesel Engr.
- ☐ Stationary Steam Engines

**TEXTILE**
- ☐ General

Name_____ Age_____ Home Address_____

City_____ Zone_____ State_____ Working Hours_____ A.M. to P.M._____

Occupation_____

Canadian residents send coupon to International Correspondence Schools, Canadian, Ltd., Montreal, Canada. . . . Special low monthly tuition rates to members of the U. S. Armed Forces.

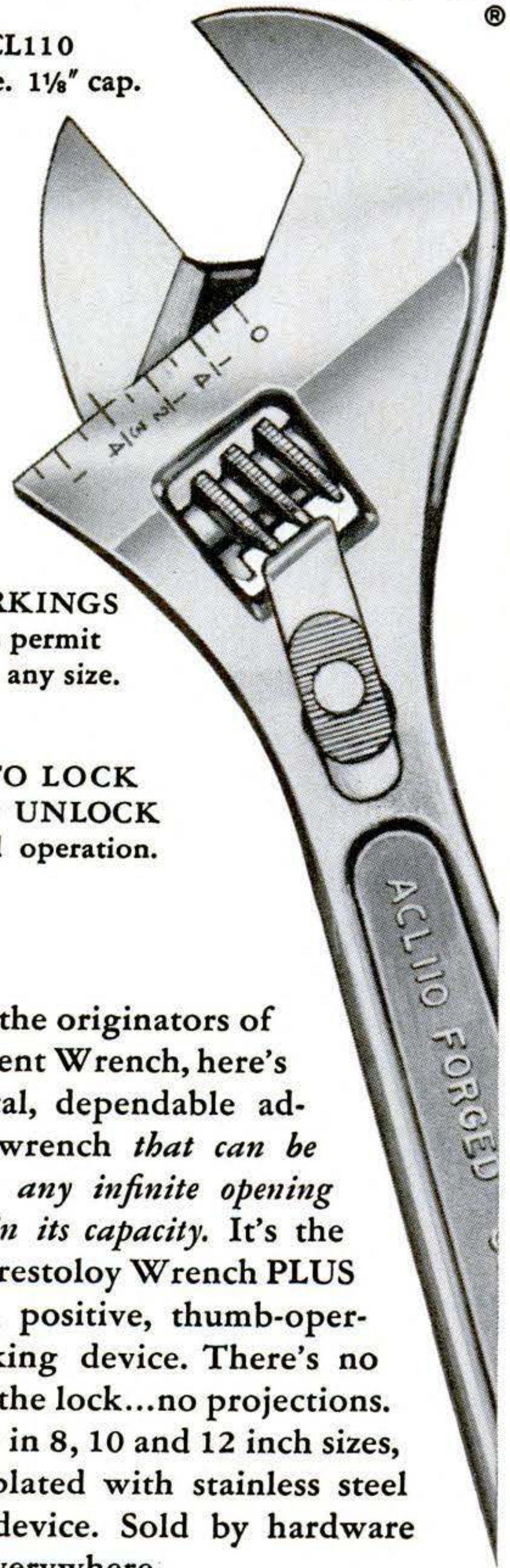


Copyrighted material

NO OTHER WRENCH LIKE

CRESTOLOCK®

No. ACL110
10" Size. 1⅛" cap.




SCALE MARKINGS
on the jaws permit
presetting to any size.

PUSH TO LOCK
PULL TO UNLOCK
one hand operation.

Made by the originators of the Crescent Wrench, here's a practical, dependable adjustable wrench *that can be locked at any infinite opening size within its capacity.* It's the famous Crestoloy Wrench PLUS a simple, positive, thumb-operated locking device. There's no strain on the lock...no projections. Available in 8, 10 and 12 inch sizes, chrome plated with stainless steel locking device. Sold by hardware dealers everywhere.

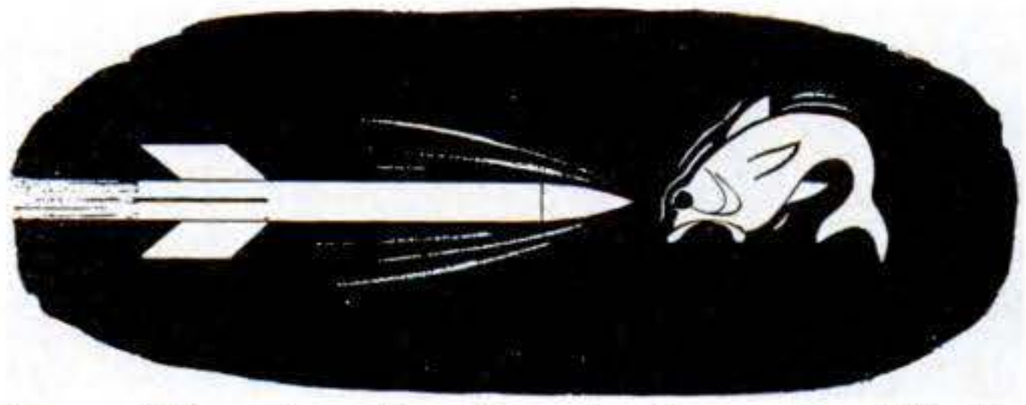
CRESCENT TOOLS
*Give Wings to Work*

Crescent is our trade-mark, registered in the United States and abroad, for wrenches and other tools. Sold by leading distributors and retailers everywhere and made only by

CRESCENT TOOL COMPANY, JAMESTOWN, N. Y.

["New Ideas from the Inventors," Nov.]. It would take too many of them on a ship weighing several thousand tons and they'd lose effect as the ship slowed down. Also, if they were fastened to a high point on the ship, as shown, they'd come up out of the water. They'd have to be fixed at, or below, the water line.

I have my own idea for emergency brakes for ships: built-in rocket units on each side of the bow, under the water



line. The touch of a button would fire them, forcing the cover off their sealed compartment. The thrust would push forward against the water and hold the ship back.

SHERMAN ROBERTS, LaCrosse, Wis.

### Green Grows the Carbonate

THE green color of weathered copper ["Copper Weather Vane in 3-D," Nov.] is due to a basic copper carbonate, not copper oxide as stated. This beautiful copper "rust" is due to the action of carbon dioxide and water vapor on the metal. Copper oxide may account for the blackening of copper left under water in some circumstances.

W. L. ORR, M.D., Ottawa, Canada

### Short Sparks Reader Resistance

LIKE the Model Garage customer ["Gus Chases a Spook," Nov.], I'm wondering how a short from terminal block to hood can burn out bulbs. Wouldn't this have a tendency to shunt out the bulb and momentarily protect it?

Gus says a sudden voltage surge burned out the bulb. However, the short would lower the voltage and increase current; and, since the bulb has more resistance than the dead short, it wouldn't affect the bulb. Also, the headlights are connected in parallel and both would burn out if there were an increase in voltage.

AL SCHONNAGEL, Dakota, Minn.

. . . GUS'S explanation doesn't seem right to me. The generator is a shunt-wound job with a resistor across the reg-



CONTINUED

Copyrighted material

# What keeps YOU from making more MONEY?

Just what is the matter—why aren't you making more money? Look around—probably many of the people you know are doing a lot better than you. What is the reason?

Your own native ability is probably just as good as theirs—your personality and appearance are probably just as good.

But—they have something you lack—the fact that they have a better job and earn more money proves that. Success today is measured by the dollar sign.

The secret is this—the man or woman who prepares and trains for the job ahead is the one who gets the advancement and more money. The person who really has something on the ball doesn't need "Pull" —"Push" is the thing that enables him to get what he or she wants.

Ambitious men and women have found the proved and tested way to get ahead in life—through LaSalle training. Hundreds of thousands of students have enrolled—our files are full of grateful letters from people who have bettered their earnings and position through LaSalle training.

Perhaps we can help you. You should at least get all the facts to judge. The coupon will bring full information FREE. Just check the field of your choice and we'll send you, without obligation, full information on that field—the money making possibilities and how you can prepare in your spare time at moderate cost.

So—if you are interested in a brighter, more profitable future, send the coupon TODAY—you may forget tomorrow.

*ACCREDITED MEMBER, NATIONAL HOME STUDY COUNCIL*

**LaSalle Extension University, *A Correspondence Institution,* 417 South Dearborn, Dept. 383X, Chicago 5, Illinois**

Please send me, without cost or obligation, FREE catalog and full information on the field I have checked below:

**ACCOUNTING**
- ☐ Modern Bookkeeping
- ☐ Basic Accounting
- ☐ Practical Accounting
- ☐ Principles of Acctg.
- ☐ Cost Accounting
- ☐ Federal Income Tax
- ☐ Accounting Systems
- ☐ Business Law
- ☐ Auditing Procedure
- ☐ Controllership
- ☐ CPA Training
- ☐ Complete Accounting

**TRAFFIC & TRANSPORTATION**
- ☐ Organization & Mgt.
- ☐ Classifications, Rates & Tariffs
- ☐ Transportation Agency & Services
- ☐ Transportation Law & Regulation
- ☐ Rate Making & Rate Cases
- ☐ Complete Traffic & Transportation

**LAW**
- ☐ Law of Contracts
- ☐ Insurance Law
- ☐ Claim Adjusting Law
- ☐ Law for Trust Officers
- ☐ Business Law I
- ☐ Business Law II
- ☐ General Law
- ☐ First Year Law
- ☐ American Law and Procedure (LL.B. Degree)

**BUSINESS MANAGEMENT**
- ☐ Principles of Management
- ☐ Psychology in Business
- ☐ Selling & Sales Management
- ☐ Advertising and Marketing
- ☐ Production Problems
- ☐ Business Financing
- ☐ Credits and Collections
- ☐ Office Management
- ☐ Managing Men
- ☐ Accounting & Statistical Control
- ☐ Business Correspondence
- ☐ Organization & Reorganization
- ☐ Legal Problems
- ☐ Complete Business Management

**MANAGEMENT COURSES**
- ☐ Basic Management
- ☐ Production Management
- ☐ Sales Management
- ☐ Advertising & Sales Promotion
- ☐ Financial Management
- ☐ Personnel Management
- ☐ Sales & Executive Training
- ☐ LaSalle Sales Training
- ☐ Foremanship Training

**HIGH SCHOOL**
- ☐ High School Preparatory
- ☐ General Business Course
- ☐ High School Diploma
- ☐ Commercial Course
- ☐ Secretarial Course
- ☐ Home Management Course
- ☐ General Culture Course
- ☐ Science Course
- ☐ Mechanical Course

**DENTAL ASSISTANT**
- ☐ Dental Assistant

**TECHNICAL COURSES**
- ☐ Auto Body Fender
- ☐ Refrigeration-Air Conditioning
- ☐ Diesel
- ☐ Drafting
- ☐ Welding
- ☐ Motor Tuneup

**STENOTYPE**
- ☐ Machine Shorthand

Name.....Age.....

Address.....

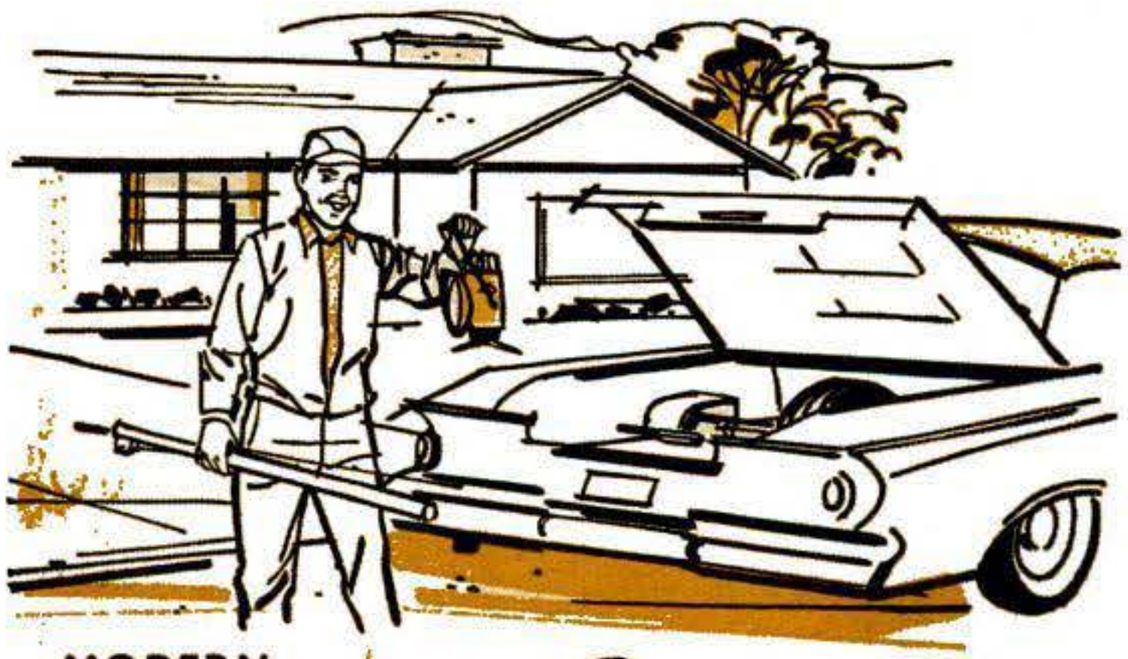
City, Zone, State.....

**CHECK THIS COUPON AND MAIL TODAY...SURE!**

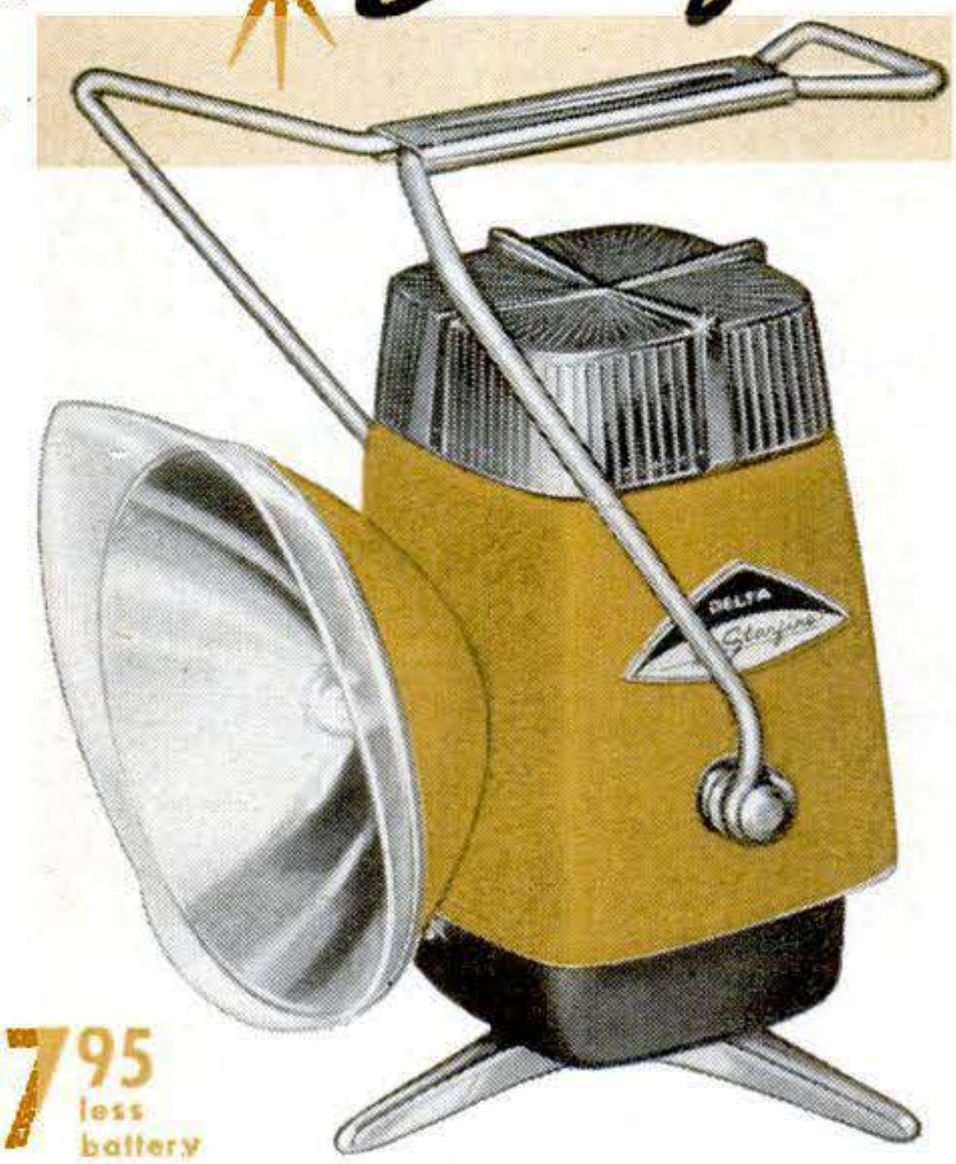


Copyrighted material

# THE LITE EVERYONE WANTS!



MODERN, ALL-NEW DELTA *Starfire*




$7.95 less battery

America's most wanted lite! Brilliant red flashing light on top for car emergencies. Nite-splitting spot beam for around the house, hunting and fishing. Handy rotary switch lets you "dial" the lite you need —spotlite, flashing red lite, or both together. Tripod legs permit level positioning on rough surfaces. Hang it or set it on the handle and point the spot beam where you need it. *See the Starfire at your Dealer's!*

Piercing spot lite. Brilliant flashing red lite.

Point the spot beam where you need it.

Hang it anyplace.

For 50 years Delta has been the leading manufacturer of quality electric lanterns. Select your next lantern from the many models made by Delta. *Write for free Fisherman's Calendar.*

**Delta** LIGHTS THE WAY

**DELTA ELECTRIC CO., 325 W. 33rd St., Marion, Indiana**


ulator contacts and a battery capable of taking a 50- or 100-amp jolt with ease. Now where does the surge come from at a particular spot like one head lamp, one tail light, or any other single spot?

I've heard lots of short-circuit tales, but most of them entail a blown fuse or a burned wire. Short circuits seek low resistance to do damage—easy going is a short's delight.

ALBERT HENRY, Salem, N.J.

*A bulb burning out because of a short circuit is a painfully familiar fact to many auto mechanics. It does happen; and did happen because of a cocked terminal block in at least one instance we know of, as described by Gus.*

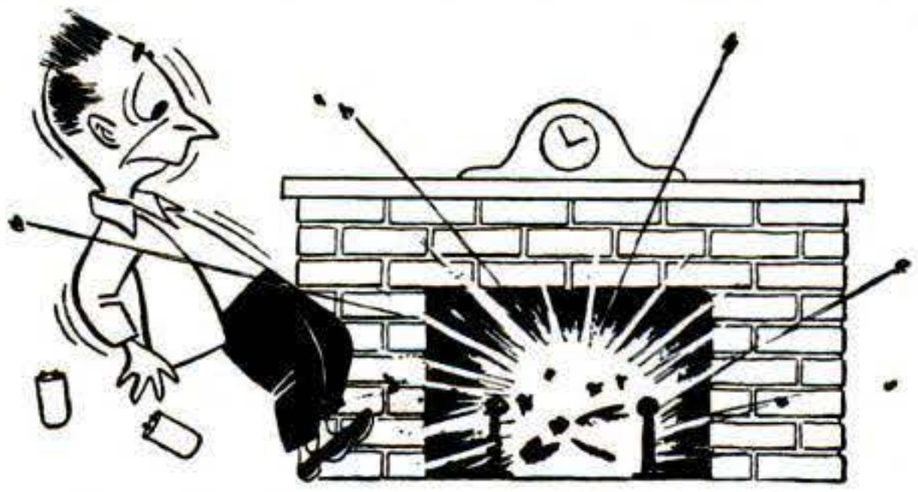
*What distinguishes this kind of short from the ordinary permanent short is that it's momentary and the short circuit is broken sharply. It's the interruption of the short circuit that causes the surge. Since there is inductance in the circuit, the situation is electrically similar to the breaker points interrupting the flow of current through the ignition coil—the rapid collapse of the magnetic field generates a high-voltage transient.*

*Differences in age and make can account for slight differences in a bulb's ability to survive a momentary overvoltage.*

### Tip for Chimney Sweeps

How's your memory? When I was a kid, there was a generally accepted theory that the way to clean the chimney, or to keep soot from settling there in the first place, was to burn old dry-cell batteries in the fireplace or furnace.

Is there anything in this idea? I know one thing—you have to chop or break



open the shell of the battery or it will explode when it gets hot.

J. R. MCCAFFREY, Malibu, Calif.

*This is an oldie, a dodge used when batteries were of the nonsealed type. The burning zinc was said to prevent soot*



CONTINUED

Copyrighted material

# 28 CARS WANTED IT!
# TEMPEST WON IT!

(Motor Trend's CAR OF THE YEAR Award goes to Pontiac's Tempest!)

The Motor Trend Magazine Car of the Year Award to Tempest marks the second time in three years that the Pontiac Motor Division has received this honor. The editors who selected it are (left to right): Robert Ames, Associate Editor. James Miller, Managing Editor. Don Werner, Editor.

These men edit one of America's leading car magazines—Motor Trend. What they know about cars can help you buy your next new car with complete confidence. They study all the different makes. Compare. Drive. Then they make one award for the year. The Motor Trend Car of the Year Award. This year these editors voted solidly for Pontiac's newcomer—the Tempest. The one car that will give the car buyer top performance, ride and economy for his nickel. Read what these experts say!

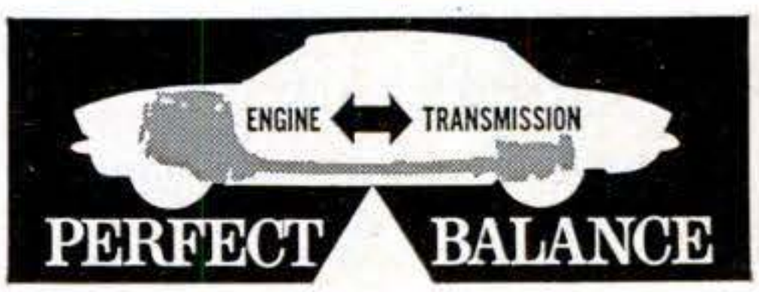
**Don Werner**—"We studied the design features of 28 American cars. The Tempest pulled ahead of the whole crop of '61 cars. The flexible drive shaft is a fantastic innovation. It's the most sensible, dependable power train we've seen."

**Bob Ames**—"Equalizing the weight on the front wheels and the weight on the rear wheels (with the front engine/rear transmission) gives the Tempest great traction and ride. Pontiac engineers scored a great breakthrough with the Tempest."

**Jim Miller**—"The Tempest 4-cylinder engine and the triple alloy steel drive shaft team up as a smooth, going combination. I had to look under the hood to convince myself they hadn't sneaked in a V-8. And that 4-cylinder engine should do wonders for gas economy."

Take it from this group of sharp automobile experts. They don't throw roses unless they mean it. Tempest took the Car of the Year Award because it's a winner. Check the facts! 110 to 155 h.p. from a gas-saving 4-cylinder engine! Big car balance =big car ride! Independent wheel suspension. Rear transmission. 15-inch wheels at no extra cost! Priced with the compacts. See your Pontiac dealer.

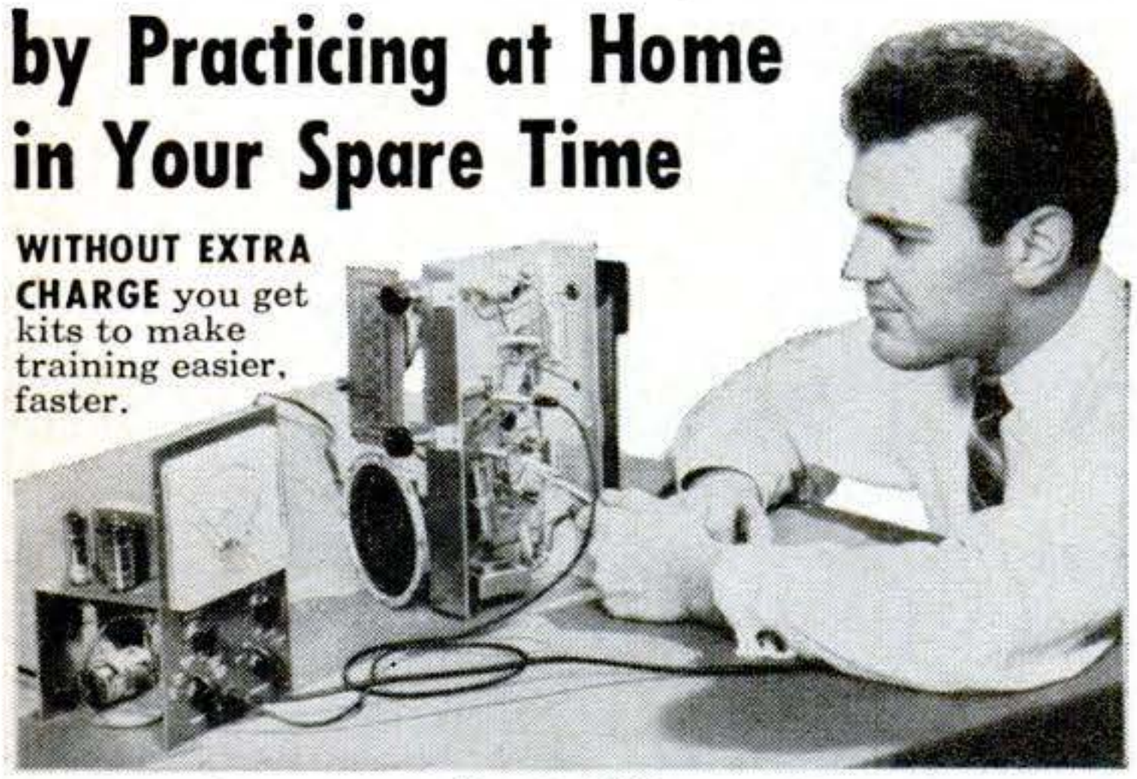
PONTIAC MOTOR DIVISION
GENERAL MOTORS CORPORATION




Copyrighted material

# Learn Electronics Radio-Television

## by Practicing at Home in Your Spare Time



**WITHOUT EXTRA CHARGE** you get kits to make training easier, faster.

## Fast Growth Offers Prestige High Pay—Bright Future

Above average jobs with bright futures await men with Electronics training . . . jobs for which YOU could qualify through NRI. Train right at home in spare time, while you hold your present job. Earn high pay in jobs with TV and Radio Stations, industrial plants, or in a profitable business of your own.

**NRI TRAINED THESE MEN**

**Own Business.** "I was working in a textile factory. Now I own a modern TV Radio service shop." A. TAYLOR, Glasgow, Ky.

**Broadcasting.** "I am now chief engineer of Station WARA. NRI was the foundation." R. ARNOLD, Attleboro, Mass.

**Industrial.** "Four months after starting your course I went to work at Raytheon. Now I am an engineering assistant in Microwave Power Tube Research." L. J. BLOOM, Newton Centre, Mass.

### Train with the Leader

For 45 years NRI has featured the best Radio-TV Electronics training for beginners—for men without high school diplomas or previous experience. NRI is the oldest and largest home-study Radio-TV Electronics school. NRI "learn-by-doing" training is supplied at low cost. It's the easy way to get into the field of Electronics.

### Start Soon to Earn More

Soon after enrolling, NRI shows you how to earn extra money in your spare time repairing sets. Many start a profitable business this way. Others get good paying jobs within a year. Take the first step to a new career NOW. Mail coupon for descriptive catalog. National Radio Institute, Washington 16, D.C.

**64 PAGE CATALOG FREE**

**MAIL THIS COUPON NOW**

**NATIONAL RADIO INSTITUTE, Washington 16, D.C.** 1CB

Send me full information without cost or obligation. No salesman will call. (Please print)

Name----------Age----

Address----------

City----------Zone----State----------

**Accredited Member National Home Study Council**


*formation. As you suggest, today's sealed batteries thrown on a fire will build up the gas pressure and explode.*

### S.O.S. to Camping Families

MY FAMILY read and reread "Here Come U. S. Minibuses" [Nov.]. We are camping fans and have been waiting for Detroit to put out a true sportsman's wagon—something plain but rugged and roomy. We could hardly wait for the local dealer to get his first Greenbrier—the Econoline still hasn't arrived.

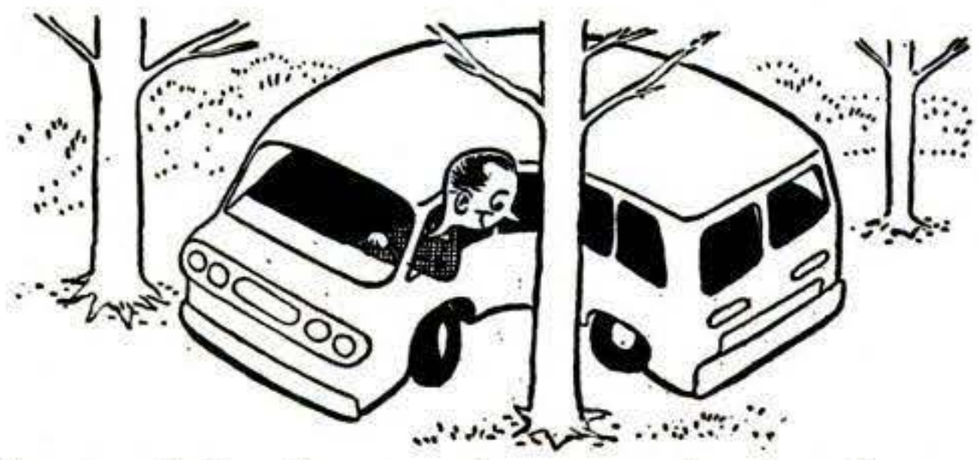
The Greenbrier seemed to fill all our requirements until we came to the problem of sleeping in it. We want to do away with loading and setting up a tent —especially in damp weather.

I have two boys plus my wife and myself to bunk down and try as I would I couldn't work out a decent arrangement. The bus isn't wide enough to sleep an adult crosswise and the step-down floor doesn't lend itself to bright ideas.

Perhaps some other reader can suggest how to solve my problem.

HERB KINNEY, Vallejo, Calif.

. . . YOU showed the Chevy Greenbrier turning circle as 19½ feet in diameter.



Since this figure is amazingly low, I wonder if some mistake was not made.

LEON DAVIDSON, White Plains, N. Y.

*A mistake certainly was made. The figure should have been 39 feet, 2 inches.*

### One Hit, One Error

ALTHOUGH I am a comparative novice at do-it-yourself projects, I know enough about gears to point out an error in the diagram on how a taxi meter works [Nov.]. The flag gears would never mesh as drawn because the teeth are at right angles to each other.

MYRON M. GELMAN, New Orleans.

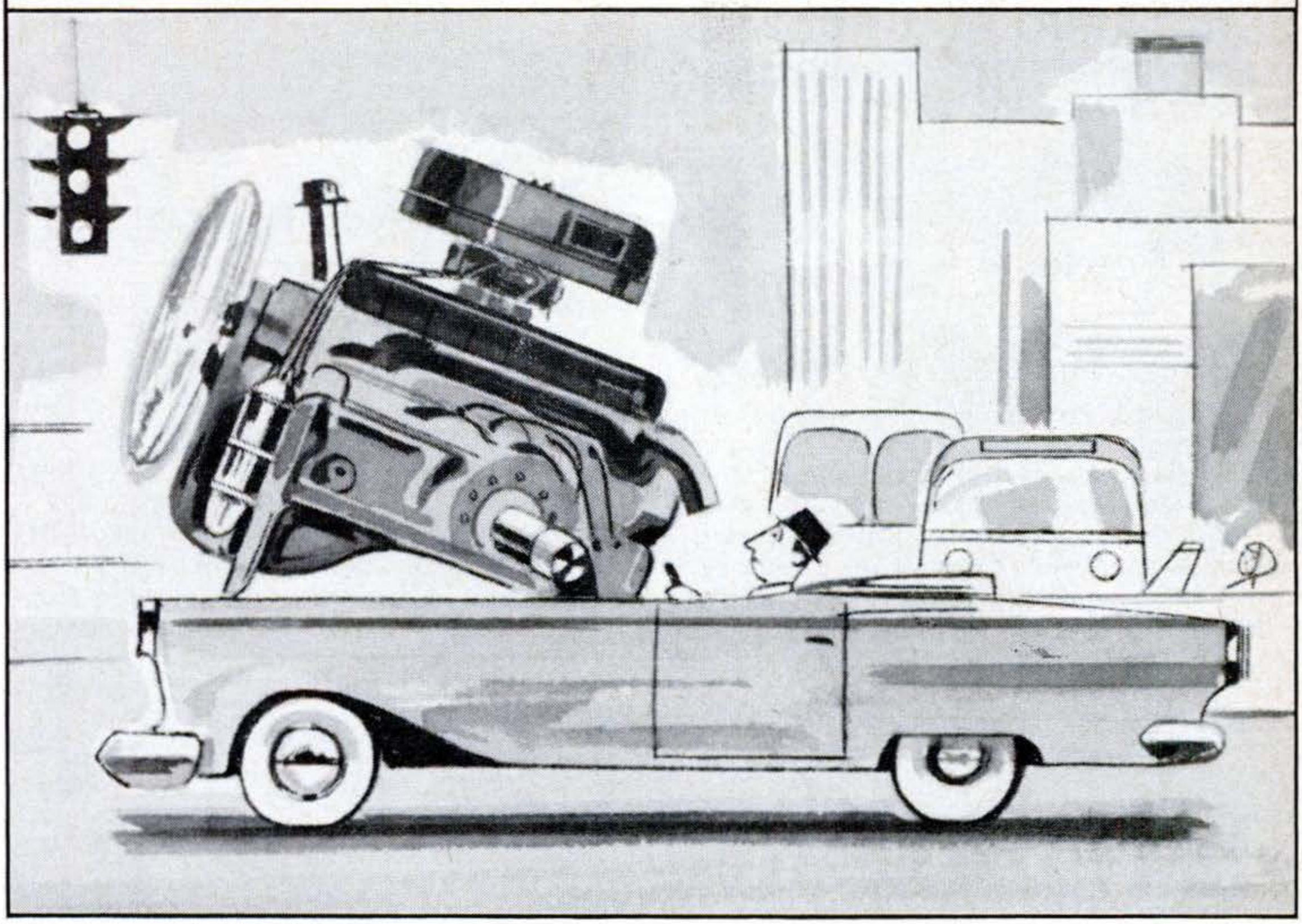
*Your eye has misled you: The eye judges the angle of the teeth in the upper gear by those visible on top. Those on the other side (the bottom, in mesh with*



CONTINUED

Copyrighted material

What to do about excessive driving costs . . .



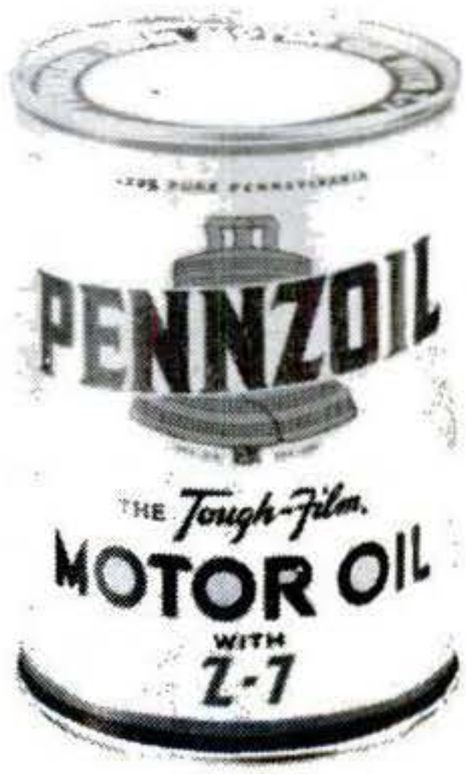
50% of your driving time

# Your engine is too big for your car

**"Easy" driving is hard on cars**— actually costs you more! In traffic, for instance, you're using only about 1/10 of your horsepower. That means incomplete combustion and gasoline waste — sludge build-up — excessive engine wear. Result: total driving costs skyrocket!

Using Pennzoil with Z-7 gives your engine the extra protection it needs in "hard", low-speed, city driving— as well as on the highway. And its exclusive power ingredient, Z-7, stays active and keeps vital parts *clean*, straight through to the next oil change.

You can keep driving costs down, step up gas mileage, get new smooth power. Just ask for Pennzoil Z-7 by name at your favorite service station, garage or car dealer. Always be sure to sound the "Z" that makes PENNsylvania OIL— PENNZOIL.




**PENNZOIL Z-7 — WORLD'S RICHEST, MOST COMPLETE MOTOR OIL**

*Member Penn. Grade Crude Oil Assn., Permit No. 2, Oil City, Pa.*

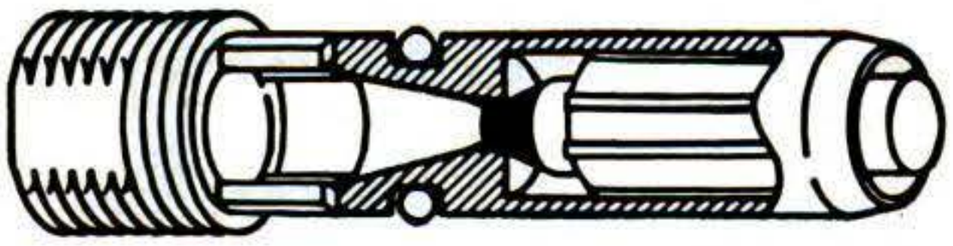


Copyrighted material

# NEW HOLLEY Viton* NEEDLE VALVE CURES MAJOR CAUSE OF CARBURETOR FLOODING

**AVAILABLE FOR ALL HOLLEY LATE-MODEL CARBURETORS**

The Holley Viton Needle Valve practically eliminates carburetor flooding caused by dirt in the fuel supply! Its resilient tip of tough Viton assures a perfect sealing of the valve and seat (virtually impossible with metal or rubber), even when there are contaminating particles in the fuel. And Viton defies abrasion and high heat. More than two years of exhaustive testing proved that the Holley Viton Needle Valve assures many thousands of miles of trouble-free service. Holley Viton needle and seat



replacement assemblies are available at low cost for all late-model Holley single, dual and four-barrel carburetors. If you are troubled with carburetor flooding, better see your Holley Distributor or Dealer *today*.

★ ★ ★

When you make your own carburetor or ignition repairs, be sure to use genuine Holley parts. Your Authorized Holley Distributor or Dealer, listed in the Yellow Pages, has a complete stock of Holley carburetor and ignition repair kits and parts, plus brand-new replacement PEP® Carburetors, priced competitively with rebuilts. All are engineered and built to original equipment standards.

*Dupont's Registered Trade Mark

ORIGINAL EQUIPMENT MANUFACTURERS OF CARBURETION AND IGNITION EQUIPMENT FOR OVER 55 YEARS

HOLLEY Carburetor Co.

C-6

11955 E. Nine Mile Road, Warren, Michigan


*the other gear) slant exactly the other—and correct—way. It's a pitfall draftsmen must watch for, and one our artist did not fall into.*

. . . ARE you sure that taxi meter your artist drew is honest? The third of the fare drums, counting from left to right, reads 5, 8, 7, 8, 9. Whatever happened to the 6? Definitely, the fare's not fair on this meter!

LOUIS NICOLOSI, Kansas City, Mo.

*The artist must have been too intent on avoiding that pitfall above.*

### Knots—or Not?

ABOUT using a rope around a tree to pull a car out of mud or away from a wall ["What to Do When Your Car Gets Stuck," bonus booklet, Dec.]:

Why in heaven's name *tie a knot* in the rope, as the pictures show?

Wouldn't it be better just to pass the rope around the tree two or three times

and hold the loose end, to snub it? Then you could quickly and easily take up the slack each time the car gains ground—and spare yourself the effort of untying a strained and balky knot. (That's assuming you have a helper at the wheel of the car—as in the picture of the first of the three tricks.)

MALCOLM STEARNS, Chicago.

. . . How come you omitted what is historically the first, and practically the best advice: Get a horse!

DR. LESTER LANDO, Monsey, N. Y.

. . . YOU say: When stuck in sand, use the jack at center of the bumper and raise both wheels, then shove sideways. This would probably work but would be expensive. The bumper on many a new car would bend nicely right where the jack was.

G. J. WEBER, Buchanan, Mich.

### Mower Vs. Cat

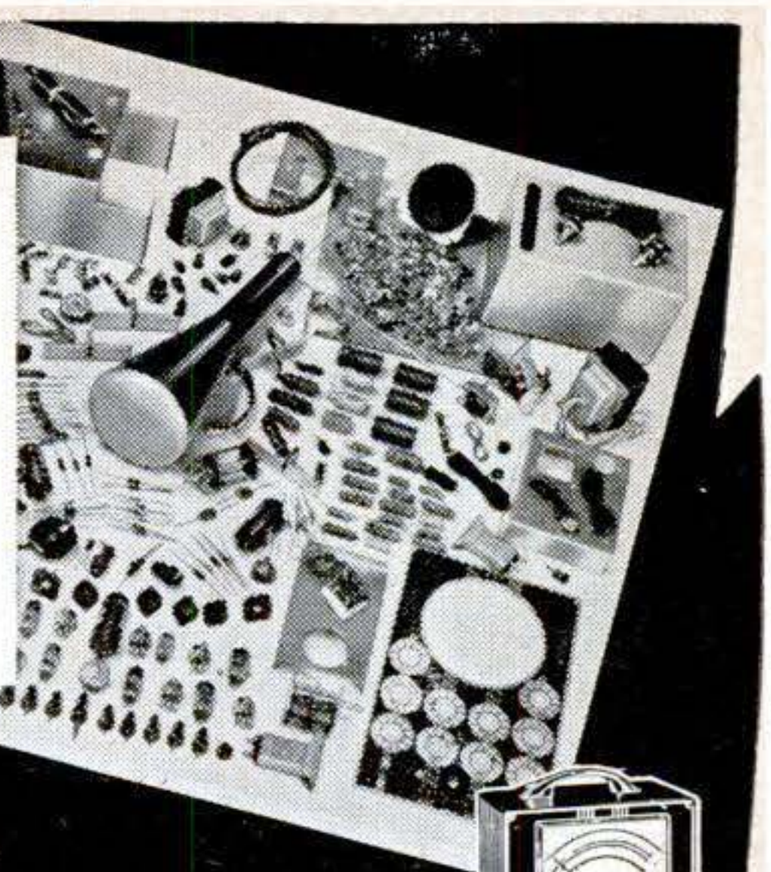
THE letter writer [Dec.] who warns against raising a power mower to clear leaves off a sidewalk because of danger to



CONTINUED

Copyrighted material

# Now! Work Over 300 PRACTICAL PROJECTS with these PARTS AT HOME!



## to help You learn

# ELECTRONICS

## RADIO—TELEVISION—RADAR

NOW . . . at home in your spare time you can get the very kind of training and subsequent Employment Service you need to get started toward real earnings in one of today's brightest opportunity fields—TELEVISION-RADIO-ELECTRONICS. Now that Electronics is entering so many new fields, here is a chance of a lifetime to prepare to cash in on its remarkable growth.

DeVry Tech's amazingly practical home method enables you to set up your own HOME LABORATORY. You spend minimum time to get maximum knowledge from over 300 practical projects, using the same type of basic equipment used in our modern Chicago and Toronto Training Centers!

### DeVry Tech Provides EVERYTHING YOU NEED . . .

—to help you master TV-ELECTRONICS. In addition to the home laboratory and easy-to-read lessons, you even use HOME MOVIES—an exclusive DeVry Tech advantage. You watch hidden actions . . . see electrons on the march. Movies help you to learn faster . . . easier . . . better.

### LABORATORY TRAINING

Full time day and evening training programs in our modern Chicago and Toronto Laboratories are also available. MAIL COUPON TODAY for facts.

### EARN WHILE YOU LEARN

DeVry Tech's practical training helps you toward spare time income servicing Radio and Television sets.

### BUILD and KEEP Valuable TEST EQUIPMENT

As part of your training, you build and keep a fine Jewel-Bearing Vacuum Tube VOLTMETER and a 5-inch COLOR OSCILLOSCOPE—both high quality, *needed* test instruments.

### EFFECTIVE EMPLOYMENT SERVICE

Get the same Employment Service that has helped so many DeVry Tech graduates get started in this fast-growing field.

### ☒ CHECK These Exciting Job Opportunities:

- TV-Radio Broadcast Technician
- Color Television Specialist
- Radar Operator
- Laboratory Technician
- Airline Radio Man
- Computer Specialist
- Quality Control Manager
- Your Own Sales & Service Shop
- . . . *PLUS MANY OTHERS*

*"One of North America's Foremost Electronics Training Centers"*

Accredited Member of National Home Study Council

## MAIL COUPON TODAY!

**DeVRY TECHNICAL INSTITUTE**
**4141 Belmont Ave., Chicago 41, Ill., Dept. PS-3-R**

Please give me your FREE booklet, "Electronics in Space Travel," and tell me how I may prepare to enter one or more branches of Electronics.

Name _____ Age _____
PLEASE PRINT

Street _____ Apt. _____

City _____ Zone ____ State _____

2045 Canadian residents address: DeVry Tech of Canada, Ltd. 970 Lawrence Avenue West, Toronto, Ontario

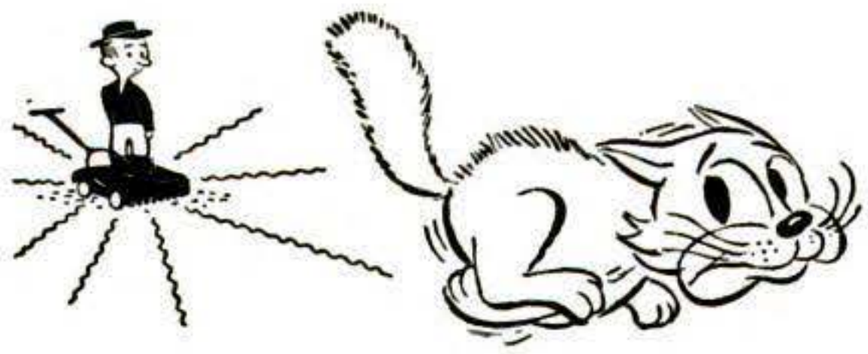
# DeVRY TECHNICAL INSTITUTE

CHICAGO 41, ILLINOIS



Copyrighted material

animals—especially cats—must have a different breed of cat in his neighborhood. My spayed female is about the bravest feline I've ever known. She even chases dogs off the place. But when I



start the mower she is careful to keep distance between herself and that noise.

W. B. SPEARS, Ecorse, Mich.

### A Bit of Prop Wash

READING about the new six-bladed propeller ["Prop Changes Curve in Flight," Dec.] gives the impression that "high camber" or high pitch is more useful for takeoff and "mild camber" or low pitch for cruising. Of course, the opposite is true. Low pitch allows the engine to rev up more and develop maximum power for takeoff. High pitch is for cruising.

Whatever happened to the one-bladed prop that was developed about 1937? I flew two lightplanes so equipped and performance was remarkable. Adjustment of pitch was completely automatic and the absence of the usual gyroscopic effect of the conventional prop was very noticeable. Most people stare in disbelief at the idea of a one-bladed prop.

G. A. VIEHMANN, New Providence, N. J.

*You are right about pitch. We were talking about "camber," however. Camber refers to blade-surface curvature, and acts oppositely to pitch.*

### Pulling Out Dents

WHY use a football to remove a dent from a car door ["Hints from the Model Garage," Dec.]? Hunt up a plumber's plunger, push it hard against the dent for good suction, pull it away, and presto, the dent is gone. You may have to do this two or three times for stubborn dents, but you don't have to remove the door paneling as with the football.

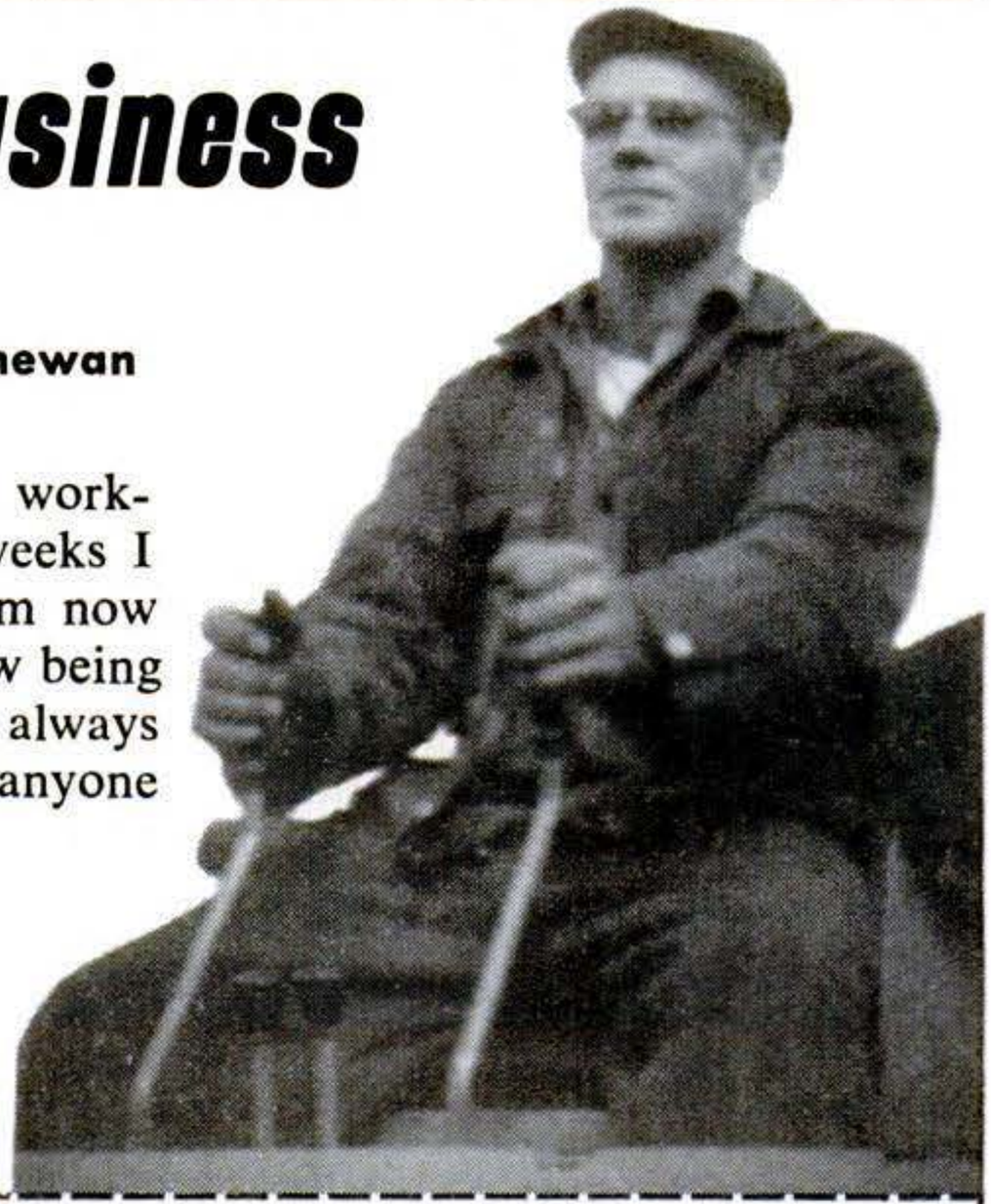
R. M. LEBLANC, New Orleans.

*You and Gus Wilson must think along the same lines. See "Gus Tames a Tough*

CONTINUED


# "I Built a Full-Time Business in six weeks"

says Jack Philip Paynton, Saskatchewan



"MY JOHN DEERE BACKHOE was first bought for working after hours and on holidays. Within four to six weeks I had enough work lined up that I quit my job and am now working full time with the unit. With a lot of farms now being equipped with water systems and sewers, I believe I'll always have plenty of work. I would recommend this unit to anyone who wants to be independent and be his own boss."

JOHN DEERE

JOHN DEERE
INDUSTRIAL DIVISION
MOLINE, ILLINOIS

*Without obligation or cost to me, please rush information on John Deere Earthmoving Equipment, plus details of the John Deere Credit Plan.*

Name.....

Occupation.....

Address.....

Dept. 2408




Copyrighted material

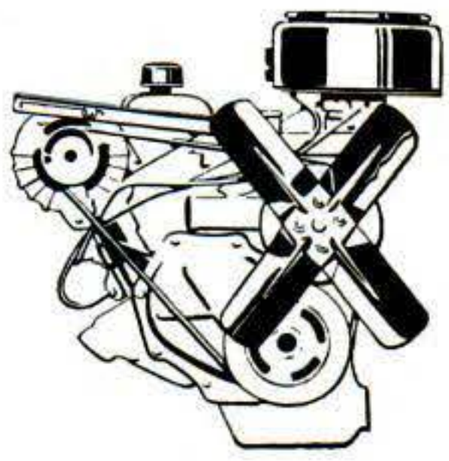
*1961 Lancer*

# *The best thing that ever happened to the 6-cylinder engine*

When Chrysler Corporation developed the new Economy Slant Six Engine, they set it at a 30° angle for good reason—a bigger manifold system. This new design provides freer breathing, helps give you 20% more "go" on 15% less gas than our previous sixes.

A new, lightweight, 3-speed automatic transmission, the TorqueFlite Six, designed especially for the Economy Slant Six, gives the added pep of a torque converter, plus the smoothness and economy of a third forward speed.

This new engine and new transmission are available in Plymouth and Dodge Dart models, with smaller versions in the Valiant and Lancer. Let a drive bring out the difference great engineering makes.



## *Chrysler Corporation*

*Serving America's new quest for quality*

**PLYMOUTH VALIANT • DODGE DART LANCER • CHRYSLER IMPERIAL**



Copyrighted material

# HOW TO FIX ANY PART OF ANY CAR

## QUICKLY--EASILY--RIGHT!

**FREE 7-DAY TRIAL**

WHETHER you're a beginner or an expert mechanic — now you can "breeze through" any "fix-it" job from simple carburetor adjustment to complete overhaul. Just look up job in index of MOTOR'S Brand-New Auto Repair Manual. Follow simple step-by-step directions, clear pictures. Presto—the job is done!

No guesswork! Manual shows where to start, what tools to use. Covers EVERY job on EVERY car listed—*from 1953 thru 1961! Includes all the new compacts.*

***Everything You Need to Know "Boiled Down" from 176 Official Shop Manuals***

BIG NEW, REVISED, ENLARGED Edition contains the "meat" from 176 OFFICIAL shop manuals — simplified for YOU. 23,436 essential repair specifications on 33 different makes. Over 1,100 big pages. More than 2,800 "this-is-how" pictures, 225,000 service and repair facts. Leads beginners every step of the way. Time-saving factory repair procedures for experts. Instructions and pictures so clear you CAN'T go wrong. Used by U. S. Army and Navy.

***Try Book FREE 7 Days***

Just mail coupon. (Attach it to postcard if you wish.) Make Manual prove what it's got. Unless you agree this is the greatest time and work saver you've ever seen—return book in 7 days, pay nothing. Mail coupon today to: MOTOR Book Dept., Desk 123, 250 West 55th Street, New York 19, New York.

**Covers ALL Models —1953 thru 1961**

| | |
|---|---|
| Buick | Jeep |
| Buick Special | Lancer |
| Cadillac | Lark |
| Chevrolet | Lincoln |
| Chrysler | Mercury |
| Comet | Nash |
| Continental | Oldsmobile |
| Corvair | Olds F-85 |
| Corvette | Plymouth |
| Dart | Pontiac |
| De Soto | Pontiac Tempest |
| Dodge | Rambler |
| Edsel | Rambler American |
| Falcon | Studebaker |
| Ford | Thunderbird |
| Hudson | Valiant |
| Imperial | |

**Same FREE Offer On MOTOR's New Truck Repair Manual**

Covers EVERY job on EVERY popular make gasoline and Diesel truck made since 1952. FREE 7-Day Trial. Check proper box in coupon.

**MAIL COUPON NOW FOR 7-DAY FREE TRIAL**
***(Attach to Postcard if More Convenient)***

**MOTOR BOOK DEPT.**
**Desk 123, 250 W. 55th St., New York 19, N. Y.**
**Rush to me at once (check box opposite book you want):**

☐ **MOTOR's New AUTO REPAIR MANUAL.** If O.K., I will remit $2 in 7 days, $2 monthly for 2 months and a final payment of $2.95 (plus 45c delivery charges and sales tax) one month after that. Otherwise I will return the book postpaid in 7 days.

☐ **MOTOR's New TRUCK REPAIR MANUAL.** If O.K., I will remit $3 in 7 days, $3 a month later, then $2 monthly for 2 months, plus 45c delivery charges and sales tax with final payment. Otherwise I will return book postpaid in 7 days.

Print Name.....Age.....

Address.....

City.....Zone....State.....

☐ **Check box and save 45c delivery charge by enclosing WITH coupon payment of $8.95 for Auto Manual (or $10 for Truck Manual) plus sales tax. Same return-refund privilege.**


*Bird" [Jan.] and you'll find that he, too, used a "plumber's helper"—to remove a dent in a gas tank.*

### Neutral or Hot?

I ENJOYED "Why Ground Electric Systems?" [Dec.] but it left me wondering about one thing. You say: "To maintain the identity of the conductors throughout the system, the [National Electric] Code requires that the neutral always be a white wire. The hot wires must be black, or some color other than white or green."

I wonder what the Code says about switch wires. Often when we wire lights with switches, we run the hot line into the junction box that the light will be fastened to. We then run Romex to the switch box, using the white wire as the feed to the switch and the black as the return to the light.

This has been acceptable to both the REA and the Missouri Power and Light Company. My boss says we do this to allow us, or anybody else, to identify switch wires in a box later on. Does the Code approve of it?

R. E. HENLEY, New Cambria, Mo.

*The Code makes a specific exception for switch legs, allowing the method you describe.*

### Making Any Folk Toys?

MAY I add a hint to folks interested in making "The Folk Toys We're All Forgetting" [Dec]? That paper boat you talk about will float better and longer if

you color the bottom with a wax crayon after making it.

LESTER MILLMAN, Rye, N. Y.

### Don't Plan a Long Cruise

YOU say you can't use decals on a watergoing sub model ["Stripping a Kit Submarine for Action," Nov.]. I undertook one of these stripping jobs and it worked out fine, but I'm not much when it comes to art work. So I put on the decals, let them dry, and then varnished them. So far, they're waterproof.

TOM FRANKEL, Bayside, N.Y.



Copyrighted material

# *Gosh, it's good to be your own boss!*

*A true story about an ad that got me started in a business of my own three years ago—that now grosses over $40,000 annually!*

ACTUAL PHOTO OF MR. LYONS. ADDRESS ON REQUEST.

## *by Michael J. Lyons*

It sure is a wonderful feeling to be your own boss and know the sky's the limit if you're willing to get in and pitch. I know, for I've been on both sides of the fence.

I'd been watching for just the right thing when I spotted an ad offering a Duraclean rug and upholstery cleaning dealership.

Now, just three years since I saw that ad, I have my own $40,000-a-year business.

I investigated the company and found it to be a top level firm respected in the field since 1930.

### Unlimited Market Potential

I found that the money-making possibilities in this field are endless. The Duraclean process itself—its safety and efficiency—told me that here was the right combination to make it BIG.

### Easy to Start—Training Free

It's easy to get started with Duraclean. Everything is provided—and a complete training course helps you build your new business.

You don't need a shop since cleaning is done in the customer's home or place of business. And with wall-to-wall carpet so popular, "on location" cleaning is really a *must!*

### Easy to Get and Keep Customers

Your success in this field is charted with a tested sales program set up by the company. First, it teaches you how to *get* customers. And when we get customers, we *keep* them because of Duraclean's fine advantages. Folks rave most over our no-scrubbing, no-soaking features which mean rapid drying and no-shrinking or texture distortion.

### 6 Ways to Make More Money

Money-making opportunities are not only in cleaning. You have 5 other services: soil retarding; mothproofing; spot removal; minor carpet repair; flameproofing . . . and 15 home care products to sell, at a nice profit.

### Security a Grand Feeling

As I start my fourth year as a Duraclean dealer, I have a profitable repeat business—satisfied customers who keep coming back for more!

If you're looking for this kind of opportunity, write Duraclean, as I did. They'll send you the facts free. No one will call on you until you *ask* for personal advice. Just fill in the coupon—this may be *your* big chance, too!

Backed by 3 famous awards

*Mail coupon today for free booklets!*

DURACLEAN COMPANY
1-183 Duraclean Bldg., Deerfield, Ill.
Please rush FREE booklets which detail how I may own my own business. I understand I am under no obligation and no salesman will call.

*Name*.....

*Address*.....

*City*.....*State*.....



Copyrighted material

# PS Puzzlers By Joan Steen

***Some riddles to ruin your rest . . . Answers on p. 238***

## How's Your Average on Average Speeds?

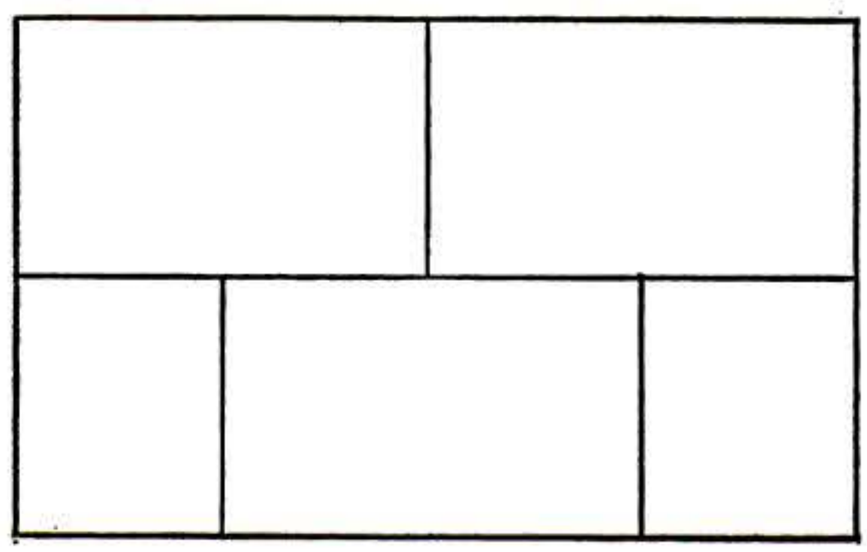
TO QUALIFY for the Spring Sports Car Meet drivers have to complete two laps around a mile track in two minutes for an average of 60 m.p.h. Dick got off to a bad start and averaged only 30 m.p.h. on the first lap.

That's all right, he thought. I can easily floorboard this buggy to 90 m.p.h. the second time around—and I'll still qualify for the speed run. Did he?

If that's too easy for you, try this: Crosstown traffic is particularly bad one morning and you average only 10 m.p.h. from the bridge exit to your office building. Going home, traffic is a little better—you cover the same distance at 15 m.p.h. What's your average speed for the round trip?

IT'S just an ordinary design—like paving bricks. But it caused me an extraordinary amount of trouble. The solution is wholly satisfying, however. Even if you give up, you feel you've been dealt with fairly.

The rules in this "unicursal" puzzle are traditional: Without lifting pencil from paper, trace a line that crosses each different line of the rectangle without recrossing any of them.

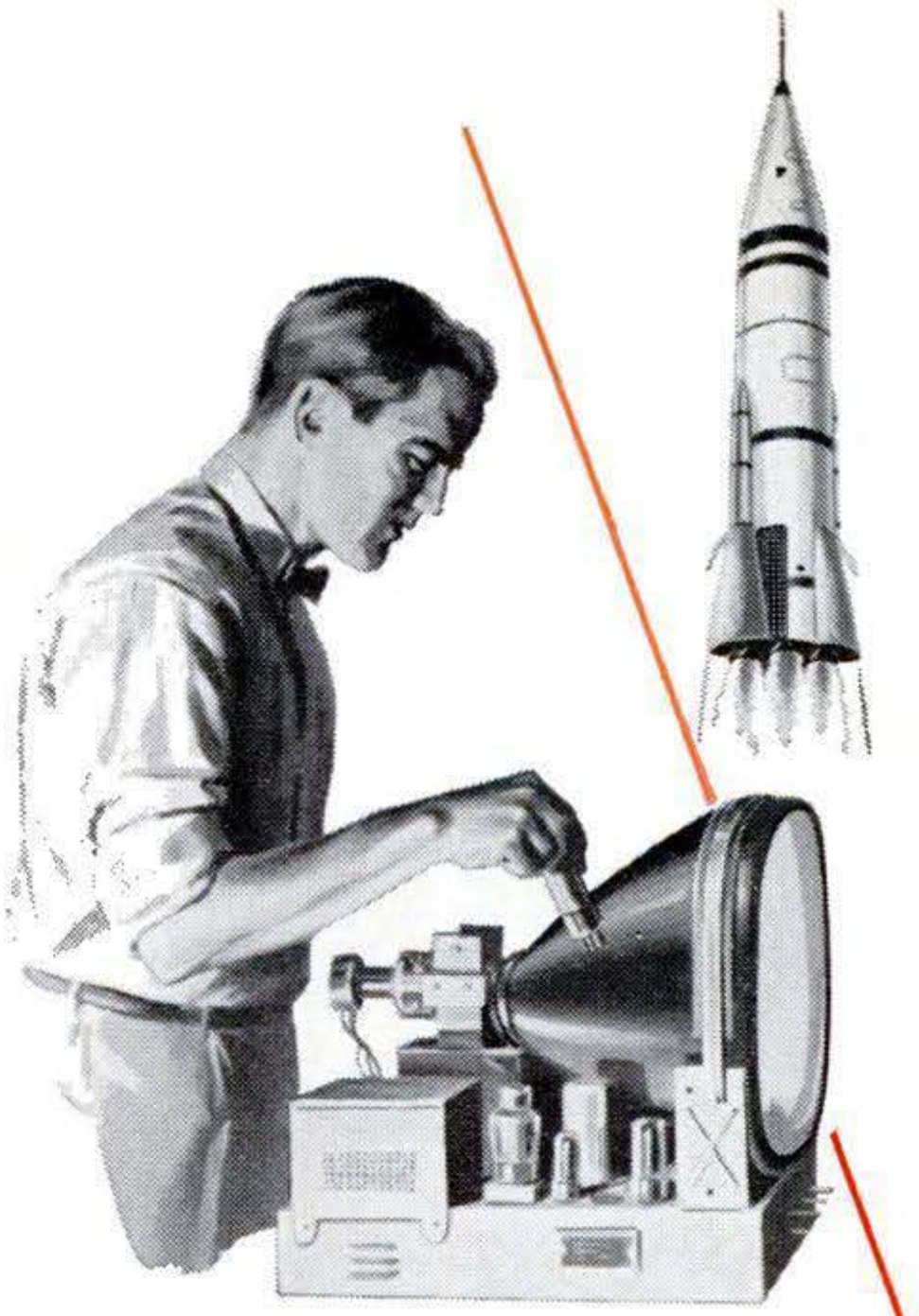


HOW often have you reached into a box of nails and picked out a bent one? Enough to be annoyed, I'd guess. Have you ever thought how the probabilities work out? Suppose a box contains 100 nails and there are 10 defectives. What would you say the chances are that out of 10 nails you select at random, none is defective? One in ten? Less?



CONTINUED

Copyrighted material



# 6 REASONS WHY RCA TRAINING IN ELECTRONICS

## can be the smartest investment you'll make in your *entire lifetime!*

**1. You get the finest training-at-home** under the supervision of the RCA INSTITUTES, experts in technical training for over 50 years. The very name "RCA" means dependability, integrity, and scientific advance.

**2. You get comprehensive training** in your choice of many complete up-to-date Courses . . . including Radio and Electronic Fundamentals, TV Servicing, Color TV, Transistors, Automation.

**3. You get Theory, Experiment, and Service Practice** starting with the very first lesson . . . a complete training package throughout the course. No special technical background is required.

**4. You get prime quality equipment** as a regular part of your Course . . . equipment that you keep and use on the job. You never have to take apart one piece to build another.

**5. Voluntary Tuition Payment Plan.** You pay for each lesson only when you order it. If you interrupt your course *at any time, for any reason,* you owe nothing more unless you resume. You *never* have to pay for the whole course if you don't complete it.

**6. You get top recognition —** Graduates of RCA Institutes now work for leaders in the electronics field; many have their own businesses. This record is true tribute to the high quality of RCA Institutes training.

**Send for this 64-page Home Study Catalog FREE!**

**RESIDENT SCHOOL** Courses in New York City and Los Angeles offer comprehensive training in Television and Electronics. Day and Evening classes start four times each year. Detailed information on request.

**RCA INSTITUTES, Inc. Home Study School**
A Service of Radio Corporation of America
350 West Fourth Street, New York 14, N. Y.
Dept. PS-31

**Please rush me your FREE illustrated 64-page book "Your Career in Electronics," describing your home training programs. No obligation. No salesman will call.**

Name .....
please print

Address .....

City ..... Zone..... State.....

Korean Vets! Enter discharge date.....

**CANADIANS — Take advantage of these same RCA courses at no additional cost. No postage, no customs, no delay. Send coupon to:**
RCA Victor Co., Ltd., 5581 Royal Mount Ave., Montreal 9, Quebec
To save time, paste coupon on postcard.



Copyrighted material

## PS Puzzlers continued

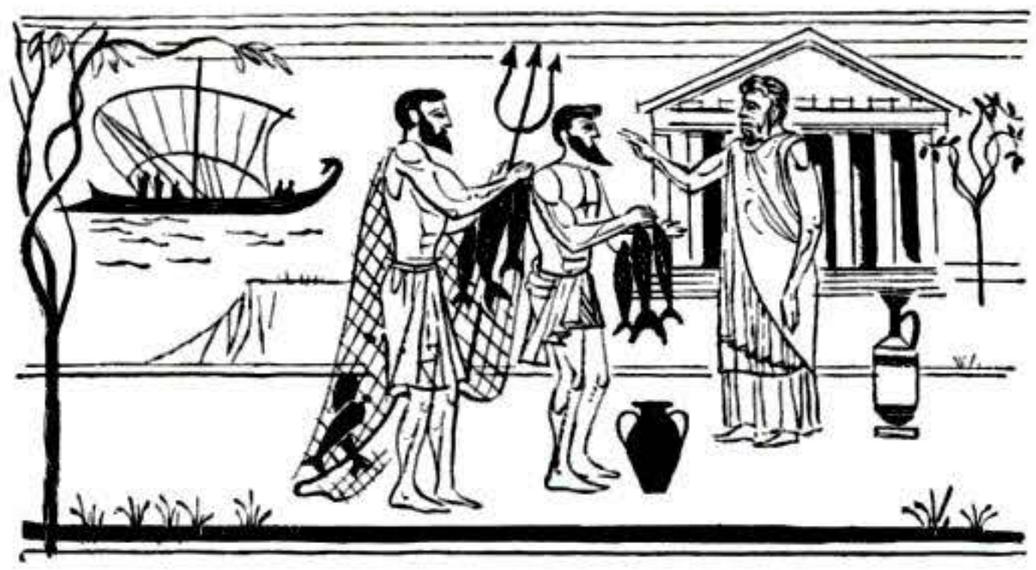
NOW let's see if we can catch you on a few fast ones.

1) Two amateur numismatists—coin collectors—met one day. "I've a real find," exclaimed one, "a copper penny marked George I."

"I'm no pro," said the other, "but you sure got rooked." How did he know?

2) It shouldn't take you too long to take four 9s and with simple arithmetical signs arrange them to add to a 100. But can you do it with four 7s?

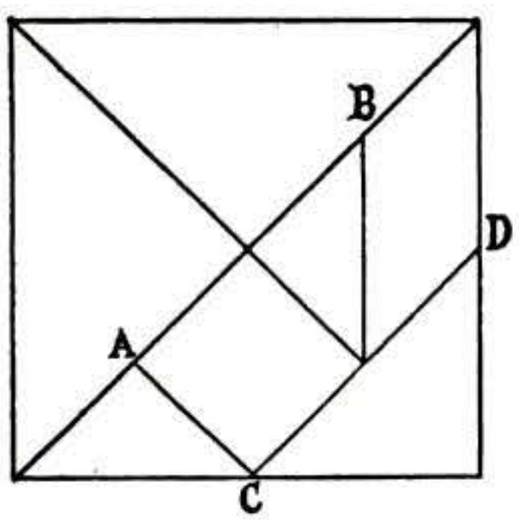
3) Homer supposedly died of fury and frustration at not being able to solve this riddle posed to him by some fishermen he met one day. "How many did you catch?" he asked. "As many as we caught, we left," they answered. "As many as we did not catch, we carry."



### Puzzle of the month

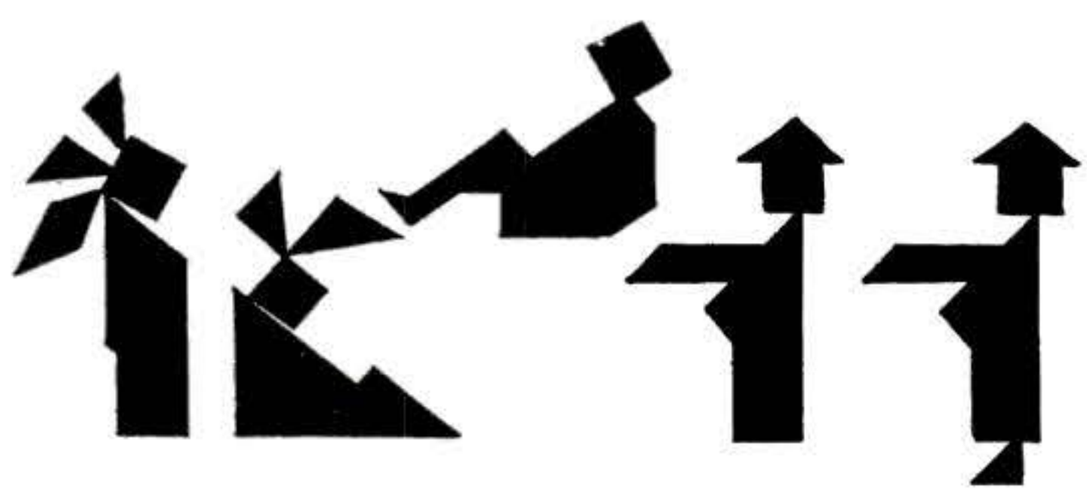
I WAS wondering how to amuse a friend in the hospital the other day when I thought of "Tangrams"—the old Chinese tile game that had once seen me through a restless convalescence. The basic seven figures are easy to cut from cardboard and the game is simply to reproduce given patterns using all the pieces (with no overlaps).

The possibilities are endless and all good Tangramers (sick or not) sooner or later make up their own. How to cut the magic seven is shown. The designs come from such eminent puzzlers as Sam Loyd and Henry Dudeney who deserves credit for the seemingly paradoxical pair. (Answers next month.)




**How to cut the Tangram**

Start with a square. Points A and B are midpoints of semi-diagonals, C and D of sides.



**Answer to last month's P-O-T-M:** There are 12 pills in a bottle. All weigh the same except one which is either lighter or heavier. You are to determine in three weighings on a scale balance which is the odd pill and which way it's off-weight.

The trick is to divide the pills into groups of four. Then, numbering them, there is a set of three weighings that takes care of all possibilities:

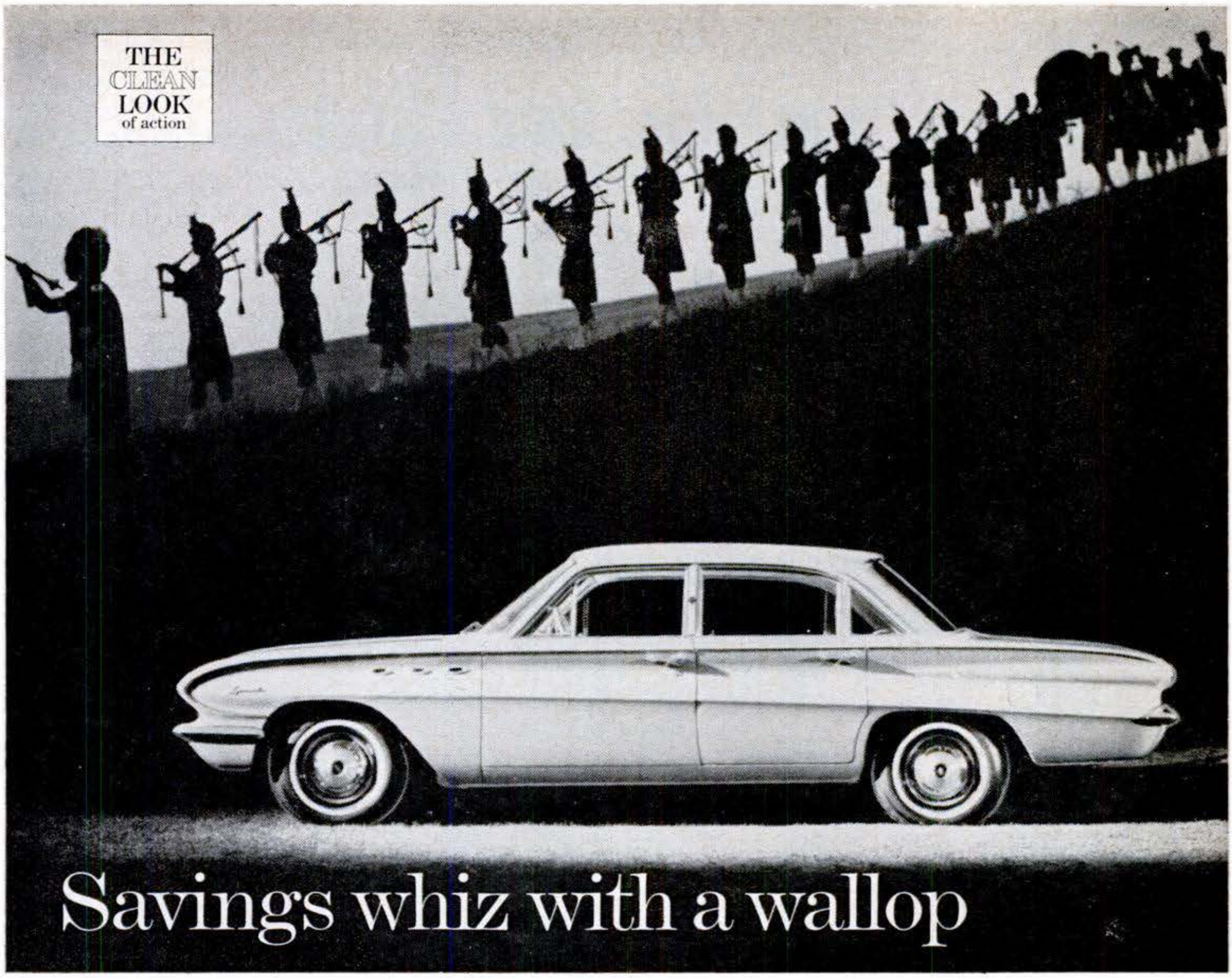
1) 1, 2, 3, 4 vs. 5, 6, 7, 8
2) 1, 2, 5, 9 vs. 3, 6, 10, 11
3) 1, 4, 7, 10 vs. 2, 3, 11, 12

For example, suppose the first weighing is balanced, and the second weighing heavy on the 1, 2, 5, 9 side. Putting both facts together you can deduce that this can only happen if 9 is heavy or if 10 or 11 is light. (The others must all be regular.) The third weighing will pin it down for you. If 1, 4, 7, 10 balances 2, 3, 11, 12, then 10 and 11 are both regular so 9 must be heavy. If the third weighing is not balanced, then either 10 or 11 is light depending on which way the scales rise.

If 12 should turn out to be the odd-weighted pill you will know automatically which way it's out at the third weighing: The two preceding weighings will have established that all other pills are of regular weight. Similar reasoning works in all other cases.



Copyrighted material




NEW ALUMINUM V-8 AND ALUMINUM TRANSMISSION GIVE YOU BUICK GO WITH SMALLER CAR GAS SAVINGS

You don't have to be a car afficionado to see why the new-size Buick Special is such a hit. The facts speak for themselves . . .

The Special has a new kind of engine — the sizzling Fireball V-8. Made of *aluminum,* it packs a 155-h.p. wallop . . . but weighs up to 200 pounds less than engines with only two-thirds its power! With the highest weight-to-power ratio in the industry — .487 horsepower per pound—this Fireball V-8 gives you more go than many a full-size car. And with 8.8:1 compression, you use just regular gas and get gas savings that challenge the compacts.

Just as exciting is the Special's new *aluminum* transmission* — liveliest automatic on any car. It works on a "dual path" principle. When cruising, about 70% of the driving forces go through a turbine torque converter, and 30% through a planetary gear set. This way you enjoy the go and gas savings of gear transmission with the smoothness of turbine drive.

Add to these Special virtues, Buick comfort, ride and pride — and you've got yourself quite a car — quite a buy, too. Drive it at your Buick Dealer's. Buick Motor Division — General Motors Corp.

**Aluminum Dual-Path Turbine Drive—optional at extra cost.*

# BUICK SPECIAL

THE BEST OF BOTH WORLDS



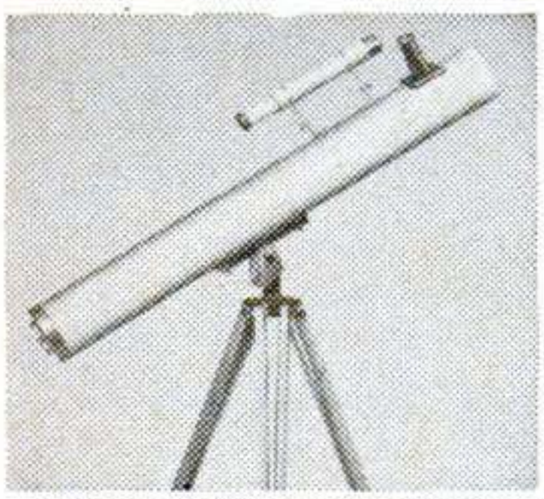
Copyrighted material

GET READY FOR THE SPACE and SCIENCE ERA! SEE SATELLITES, MOON ROCKETS CLOSE-UP

# AMAZING SCIENCE BUYS for FUN, STUDY or PROFIT

## See the Stars, Moon, Planets Close Up!
## 3" ASTRONOMICAL REFLECTING TELESCOPE

**60 to 180 Power—Famous Mt. Palomar Type! An Unusual Buy!**



Assembled—Ready to use! You'll see the Rings of Saturn, the fascinating planet Mars, huge craters on the Moon, Star Clusters, Moons of Jupiter in detail. Galaxies! Equatorial mount with lock on both axes. Aluminized and overcoated 3" diameter high-speed f/10 mirror. Telescope comes equipped with a 60X eyepiece and a mounted Barlow Lens, giving you 60 to 180 power. Low-cost accessory eyepiece available for higher powers. An Optical Finder Telescope, always so essential, is also included. Sturdy, hardwood, portable tripod. FREE with Scope: —Valuable *STAR CHART* plus 272 page *"HANDBOOK OF HEAVENS"* plus *"HOW TO USE YOUR TELESCOPE"* BOOK.

**Stock No. 85,050-N .....$29.95 postpaid**

## BLACK LIGHT MAGIC-GLOW KIT

Kit uses long-wave blacklight, which is completely harmless to eyes, but causes fluorescence in over 3,000 substances. Includes Magic Glow Lamp, stand, invisible water paints and ink, fluorescent crayon, tracer powder, pen, 3 brushes, specimens of fluorescent rocks: wernerite from Canada, fluorite from England, willemite from U.S.

**Stock No. 70,256-N .....$10.95 Pstpd.**

## MAGNETISM AND MAGNETS

**Small low-priced ceramic magnets, ¾" x 1".** Make any metal surface a bulletin board.
**Stock No. 40,428-N Pkg. of 12 .....$1.00 Pstpd.**
**Stock No. 60,142-N Pkg. of 100 .....$5.00 Pstpd.**

**Personal pocket magnet.** Powerful 1" square x ½" deep Alnico magnet. Picks up 4½ lb., holds 6 lb. With keeper in leatherette case.
**Stock No. 40,424-N .....$1.00 Pstpd.**

**Magnet Set.** Ideal for learning about magnetism. Two cylindrical magnets, one U-shaped and one horse magnet. All of steel, approx. 3" long.
**Stock No. 40,390-N .....$1.75 Pstpd.**

**Cylindrical Alnico Magnets.** High strength, ideal for demonstrations, each ⅜" diam. x 5" long.
**Stock No. 60,131-N (One Pair) .....$3.00 Pstpd.**

## ANALOG COMPUTER KIT

Demonstrates basic analog computing principles—can be used for multiplication, division, powers, roots, log operations, trig problems, physics formulae, electricity and magnetism problems. Easily assembled with screwdriver and pliers. Operates on 2 flashlight batteries. Electric meter and 3 potentiometers are mounted on die-cut box. Answer is indicated on dial. Computer is 20" long, 9" wide, 2" deep. **Stock No. 70,341-N.....$14.95 postpaid**

## SCIENCE TREASURE CHESTS

**For Boys—Girls—Adults!**

**Excellent "Science Fair" Material!**

**Science Treasure Chest**—Extra-powerful magnets, polarizing filters, compass, one-way-mirror film, prism, diffraction grating, and lots of other items for hundreds of thrilling experiments, plus a Ten-Lens Kit for making telescopes, microscopes, etc. Full instructions included.
**Stock No. 70,342-N.....$5.00 Postpaid**

**Science Treasure Chest DeLuxe**—Everything in Chest above plus exciting additional items for more advanced experiments including crystal-growing kit, electric motor, molecular models set, first-surface mirrors and lots more.
**Stock No. 70,343-N .....$10.00 Postpaid**

## BUILD A SOLAR ENERGY FURNACE

A fascinating new field. Build your own Solar Furnace for experimentation—many practical uses. Easy! Inexpensive! Use scrapwood! We furnish instructions. This sun powered furnace will generate terrific heat—2000° to 3000°. Fuses enamel to metal. Sets paper aflame in seconds. Use our Fresnel Lens—14" diameter . . . f.l. 14".
**Stock No. 70,130-N . . . Fresnel Lens . . . $6.00 Postpaid**

## NEW! SCIENCE FAIR PROJECT KITS

Carefully planned to give any boy or girl the fun and excitement of discovering science facts. Can lead to awards or scholarships!

### *For Junior High School and beyond:*

**MOLECULE AND CRYSTAL MODELS KIT**—Rods and balls to make atomic models, plus directions. **Stock No. 30,413-N.....$2.50 Postpaid**

**NUMBER SYSTEMS ABACUS**—Makes a dramatic exhibit demonstrating number systems other than the decimal system—
**Stock No. 70,334-N.....$4.25 Postpaid**

**SOIL TESTING KIT**—Basis for many fascinating experiments regarding growth of plants, etc. **Stock No. 60,118-N.....$2.00 Postpaid**

**TOPOLOGY—All** the ingredients for a project on 4 color map problems, Moebius strips, etc.—**Stock No. 70,353-N.....$6.00 Postpaid**

**CRYSTAL GROWING KIT**—Grow breathtaking display of large crystals with this set—**Stock No. 70,336-N.....$9.50 Postpaid**

### *For Ages 8 thru Jr. High School:*

**MAGNETISM KIT**—Based on magnetism demonstrations developed by UNESCO—**Stock No. 70,325-N .....$3.75 Postpaid**

**COLOR THROUGH POLARIZATION**—Show the beautiful color effects produced by passing polarized light through transparent objects—**Stock No. 70,350-N.....$2.00 Postpaid**

**OPTICAL ILLUSION KIT**—Diagrams, lenses, mirrors, etc., for producing many amazing optical illusions.
**Stock No. 70,352-N .....$3.00 Postpaid**

## War Surplus American-Made 7x50 Binoculars

Big savings! Brand new! Crystal clear viewing —7 power. Every optical element is coated. An excellent night glass—the size recommended for satellite viewing. Individual eye focus. Exit pupil 7mm. Approx. field at 1,000 yds. is 376 ft. Carrying case included. American 7 x 50's normally cost $195. Our war surplus price saves you real money.
**Stock No. 1533-N** **Only $55.00 pstpd.** (Tax included)

## Circular Diffraction Grating Jewelry

**A Dazzling Rainbow of Color!**

Exquisite beauty! Just as a prism breaks up light into its full range of individual colors, so does the Diffraction Grating. 1" diameter.
**Stock #30,349-N Earrings .....$2.75 Ppd.**
**Stock #30,350-N Cuff Links .....$2.75 Ppd.**
**Stock #30,372-N Pendant .....$2.75 Ppd.**
**Stock #30,390-N Tie-Clasp .....$2.75 Ppd.**

## OPAQUE PROJECTOR

Projects illustrations up to 3" x 3½" and enlarges them to 35" x 30" if screen is 6½ ft. from projector; larger pictures if screen is further away. No film or negatives needed. Projects charts, diagrams, pictures, photos, lettering in full color or black-and-white. Operates on 115 volt, A.C. current, 6-ft. extension cord and plug included. Operates on 60 watt bulb, not included. Size 12" x 8" x 4½" wide. Weight 1 lb., 2 oz. Plastic case with built-in handle.
**Stock No. 70,199-N .....$7.95 postpaid**

## MINIATURE WATER PUMP

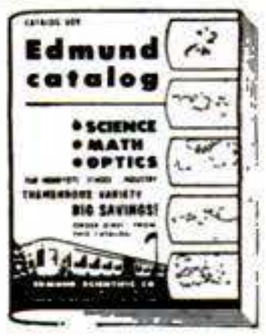
Wonderful for experiments, miniature waterfalls, fountains, Christmas gardens, HO gage railroad backdrops, etc. Tiny (2⅝" x 1¾") electric motor and pump ideal for hobbyists, labs, schools. Pumps continuous flow of water at rate of one pint per minute at a 12" head. With 2 D Batteries in series will pump to 24" high. Works in either direction. **Stock No. 50,345-N .....$3.95 Postpaid**

## NEW! PORTABLE FLUORESCENT LIGHT
**Plugs into CAR CIGARETTE LIGHTER**

Provides bright light without fuss or muss or danger of fire or explosion from kerosene, etc. It is excellent for camping trips, picnics, in garages, on patio, farms or boats. It is a vital necessity when storms interrupt electric service. Can be used continually for 15 hours without having to drive the car—uses less power than parking lights. This 18" long aluminum lamp comes complete with light fixture, power pack, 15 watt fluoro tube, 35 foot cord. (Will not work on household current).
**Stock No. 70,356-N (6 volt) .....$14.95 Pstpd.**
**Stock No. 70,357-N (12 volt) .....$14.95 Pstpd.**

## FREE CATALOG-N

**144 Pages! over 1000 Bargains!**




Complete line of Astronomical Telescope parts and assembled Telescopes. Also huge selection of lenses, prisms, war surplus optical instruments, parts and accessories. Telescopes, microscopes, binoculars, infrared sniperscopes, science experiment items, math learning and teaching aids.

**REQUEST CATALOG-N**

ORDER BY STOCK NUMBER . . . SEND CHECK OR MONEY ORDER . . . SATISFACTION GUARANTEED!

**EDMUND SCIENTIFIC CO.** BARRINGTON, NEW JERSEY



Copyrighted material

By Martin Mann

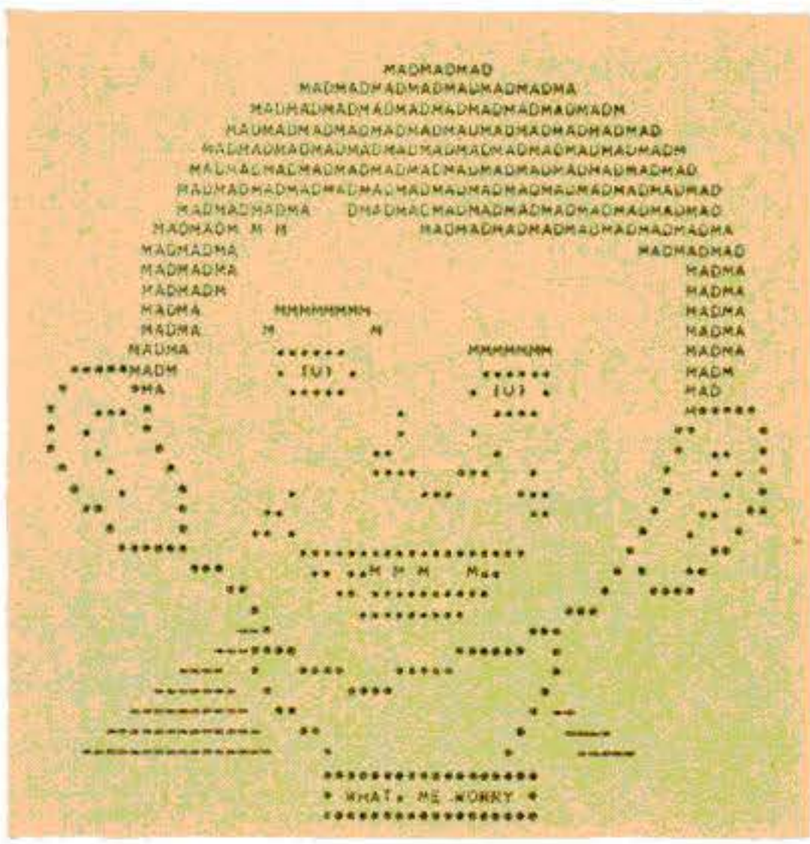
# The month in science

**Now hear this, IBM 704.** Everybody talks to machines. It is well known that selected profanity will arouse a balky engine. Every time you dial a telephone number, you talk to a machine.

When you talk to the telephone system, you have to use its native tongue, electrical pulses. That's not hard, since 100 pulses, at the most, will get you practically anybody in the U.S. But if you want to do something more involved than ringing up Aunt Minnie in Oscaloosa—like designing an airplane wing or solving problems in quantum mechanics—you need a smarter electric brain than the phone exchange. The native tongue of these high-IQ robots is binary code, a two-digit number system that 10-fingered people find clumsy (the number 13 comes out 1101). So automatic computers have been taught the decimal system (they convert decimal to binary in their transistorized heads).

Yet even this is not enough, reports Robert Sanford in the United Aircraft publication *Bee-Hive*. Talking to computers in numbers takes too long and causes too many errors. You can't afford to waste time or make mistakes on a machine that rents at the rate of $5 per *minute*.

Now the brainiest of the brains have been taught crude versions of English. (Russian computers presumably talk Russian.) You can't actually speak to them (no ears). You send them telegrams. The computer is hooked to a teletypewriter on which you bang out orders in the appropriate dialect. If the machine understands IBM Commercial Translator, for example, here's how to tell it to calculate overtime, social security, and income tax for a payroll:




One reply to misdirection

COMPUTE. PAY. IF DETAIL HOURS IS GREATER THAN 40 THEN SET DETAIL GROSS = (DETAIL HOURS–40) * MASTER RATE * 1.5. SET DETAIL GROSS = DETAIL GROSS + MASTER RATE * 40, DO FICA. ROUTINE, DO WITHHOLDING. TAX. ROUTINE.

The machines talk back the same way, printing out their replies in English on the typer. Some of these literate robots have been endowed with college-type wit by their mathematician masters. One machine reacts to wrong instructions by blinking its neon-red eyes malevolently and printing out YOU IDIOT, YOU IDIOT, YOU IDIOT. Another, programed to speak the MAD dialect (for Michigan Algorithm Decoder), cries tilt by printing out a typewriter picture (above) of *Mad* magazine's comic character, Alfred E. Neuman, complete with motto.

Conversational ability is one clue to machines' intelligence. The British mathematician Turing said (in 1938, before the first digital computer had been built) that a real thinking machine could carry on a conversation with a man in another room—and the man

CONTINUED



Copyrighted material

couldn't tell if he were talking to a machine or another man. Some new computers almost pass this test. Here's an excerpt from a man-machine chat about the weather:

*Man:* In hot weather one needs at least one bath a day.
*Computer:* Yes, I was just out and it was sweltering.
*Man:* When Christmas comes we will have some colder weather.
*Computer:* Cold? Yes, it's usually pretty frosty during December.

The robots haven't quite taken over yet, though. Robert Sanford points out that no computer dialect includes the word "think." The machine wouldn't know what to do.

**More light for less money.** What sounds like the biggest improvement in light bulbs since Edison's day has been invented by Luke Thorington, research director for the Duro-Test Corp. of North Bergen, N.J. Still in the development stage, it is a combination incandescent-fluorescent that looks like a movie-projector lamp, screws into a standard socket (no starter), and should cut home electric bills sharply.

Ordinary incandescent lights, while pleasing and convenient, throw away a shocking amount of electricity—90 percent of the watts they consume becomes annoying, unilluminating heat. Now Thorington has conjured up a neat trick for converting that waste heat into light.

His combination bulb contains a hot (4,000 degrees F.) tungsten filament, like an incandescent, and a thin coating of phosphor chemicals (zinc silicate and manganese) inside the glass, like a fluorescent. The bulb is filled with a little hydrogen gas (instead of the nitrogen-argon used in incandescents, or the mercury-argon used in fluorescents). The hydrogen is the trick.

The hot tungsten breaks the hydrogen molecules apart into their two component atoms. The divorced hydrogen atoms zip over to the phosphor surface, where they hitch up into molecules again. This recombination releases a hefty wallop of energy that is just right for nudging the phosphor atoms into fluorescing with useful light. Then the hydrogen molecules can go back to the filament to be split apart again.

This filament-to-hydrogen-to-phosphor triple play, Thorington figures, should deliver three times as much light for every watt consumed as present incandescent bulbs do. You'd light your house on one-third the electricity you use now.

**Space hi-fi.** Historic signals from man's first space explorers (including the heartbeat of Laika, the dog orbited by the USSR) are now available for playback at home. They were recorded by Prof. Thomas A. Benham of Haverford College from Sputniks I and II, Vanguard I, and Explorers I, II, and III.

Accompanying the signals is a commentary by Professor Benham that explains their meanings. Price of a 10-inch LP record or 7½-inches-per-second tape is $3.95 from Taben Recordings, Box 224E, Ardmore, Pa.



Copyrighted material

# CHOOSE YOUR JOB TRAINING—THEN LEARN BY DOING

Exciting work—if you can get it. To land a job as a Telephone Lineman, you need **training.** The kind of training you get through the Army Choose-it-Yourself System.

If you qualify (by passing aptitude and physical exams), this system lets you choose your job training **before** you enlist.

On-the-job or in school, Army training is practical. You learn by doing, and it helps you move ahead fast in the Army.

You can choose from many different kinds of job training. Telephone Maintenance is one possibility. There's also Motor Mechanics, Electronics, Missiles, Military Police, Aircraft Maintenance—to name a few. Ask your Army recruiter to show you a complete list.

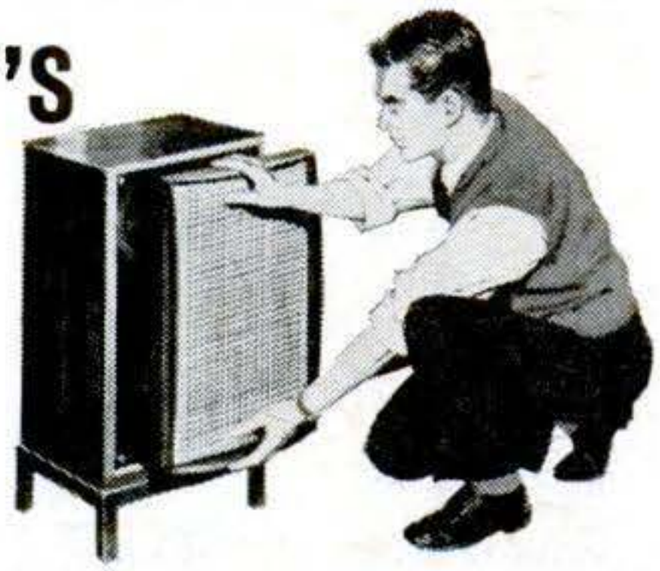
Can you qualify for the job training you want? It's easy enough to find out.

Before enlistment. Without obligation.

**CHOOSE-IT-YOURSELF VOCATIONAL TRAINING SYSTEM** **US ARMY**

Copyrighted material

# UNIVERSITY'S MEDALLION KIT features 5 'Select-a-Style'™ snap-on grilles



**NOW, the exciting new styling concept of the Medallion** XII speaker system is available in cabinet kit form too! For the first time, you can take pride in assembling a high fidelity speaker cabinet that's styled to your taste . . . *and hers too!* The secret's in the interchangeable snap-on grilles, available in Swedish Modern, Colonial, Italian Provincial, French Provincial and Contemporary. Practical? If you ever change your decor, just change the grille.

**Each grille frame is authentically interpreted, expertly** crafted and pre-assembled for you, with only the grille cloth and hardware to be mounted. The cabinet itself is easy to assemble, with every piece precision machined to the closest tolerances . . . selected ¾" hardwoods assuring resonant-free performance. And smooth-grained veneers make it easy to achieve a professional finish.

**The Medallion's exceptional versatility extends to its** speaker mounting board as well . . . letting you plan virtually any type of multi-speaker system using either a high compliance or high efficiency 12" woofer, 8" cone speaker or driver/horn for mid-range, and wide-angle horn or University's fabulous Sphericon for treble. If you desire a single integrated wide-range speaker, University's new Series 200 high compliance speakers will easily outperform most multi-speaker systems.

**And it fits anywhere! On floor or** bench...even built-in. With or without its matching base, as highboy or lowboy. Only 17"x24"x12½" deep, it's ideal as a stereo pair.

**See the Medallion at your University** dealer now. You'll surely agree that as a kit, assembled cabinet, or complete Medallion XII speaker system, it's the most intriguing and sensible idea yet in high fidelity!

**NET PRICES:** Cabinet kit — $49.95. Grille kits—Contemporary, $7.95. others, $12.95 each. Base kit—$12.95.

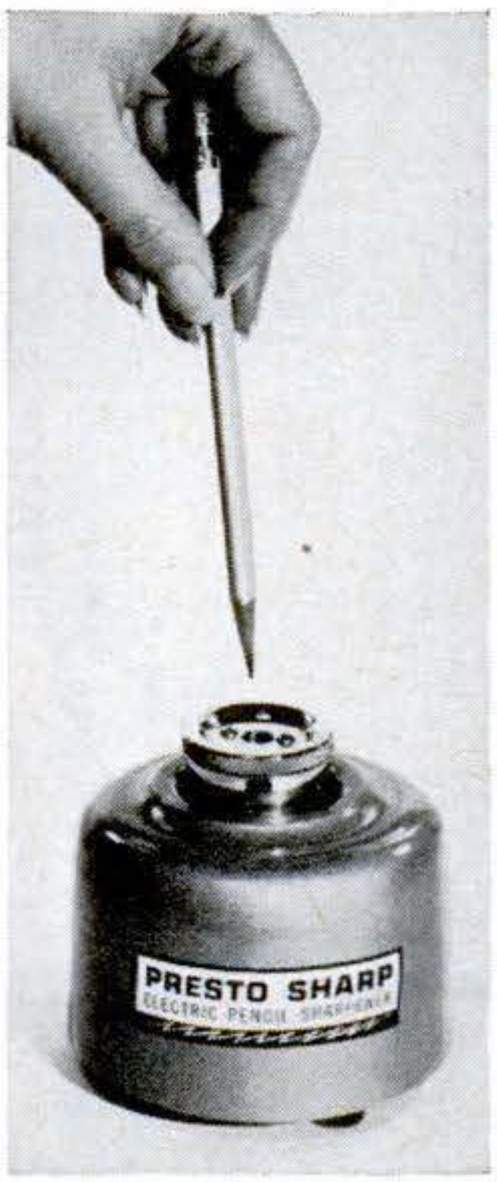
Write for University's new 'Informal Guide to Component High Fidelity.' Desk B-3, University Loudspeakers, Inc., White Plains, N.Y.

UNIVERSITY

A Division of Ling-Temco Electronics, Inc.

# AMAZING NEW *Automatic* ELECTRIC PENCIL SHARPENER

ONLY $4.95 Postpaid




- **Fully Automatic! No Handles To Crank**
- **Battery Operated! No Wires To Plug In**
- **Operates 6 Months to 1 Year on Small Flashlight Batteries**
- **Fast! Sharpens Pencils Quickly . . . Easily . . . Perfectly!**

Now at last you can sharpen your pencils in *seconds* . . . and *keep them sharp* . . . without ever leaving your desk!

Amazing new PRESTO SHARP portable electric pencil sharpener is so simple and easy to use you can sharpen pencils with *only one hand!* Operates 6 months to 1 *year* on inexpensive flashlight batteries.

PRESTO SHARP's precision mechanism is encased in beautiful silver-gray *metal* case with chrome trim. Ultra-modern design makes Presto Sharp an attractive, practical desk accessory.

AMAZING TRIAL OFFER

Mail No-Risk trial coupon below. When PRESTO SHARP arrives, use it in your home . . . at your office . . . use it for 30 days *entirely* at our risk. If you are not completely delighted, simply return for full refund. But don't delay. Supplies are limited. Mail order today! Batteries not included.

## MAIL AMAZING TRIAL COUPON

**Harrison Home Products Corp.,** Dept. 34-PS
8 Kingsland Avenue, Harrison, New Jersey
Gentlemen:
Please send me amazing new PRESTO SHARP on 30 Day No-Risk Trial. If I am not delighted I will return for full refund.

☐ **Payment Enclosed.** Enclosed find $4.95. I save all postage charges.

☐ **Send C.O.D.** I will pay postman $4.95 plus C.O.D. postage.

Name .....

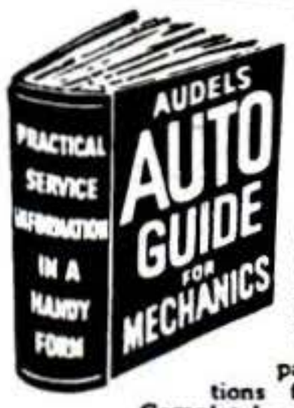
Address .....

City .....State .....




Copyrighted material

# WHAT ALL AUTO MECHANICS WANT TO KNOW




This Big Practical Book gives full information, with working diagrams, covering the principles, construction, ignition, service and repair of modern cars, trucks and buses.

**Air Conditioners, Hydramatic & Fluid Drives Fully Explained.**

A complete guide of 1132 Pages, with over 1000 Illustrations showing inside views of working parts, with instructions for service jobs. Completely up-to-the-minute! Priced at only $6.

**CIRCLE No. 1 IN COUPON**

# HOW TO FIX HOME APPLIANCES

**REFRIGERATORS WASHERS TOASTERS DRYERS IRONERS RANGES VACUUMS FREEZERS**

*Many other GAS AND ELECTRIC APPLIANCES*

Handy Reference for Electric & Gas Servicemen, Mechanics, Dealers and Homeowners. Explains clearly and simply how to locate troubles, how to test, reassemble and connect. Wiring diagrams. 1000 Facts. Easy to read. Answers ALL your questions. 864 Pages. Illustrated. Only $6.

**CIRCLE No. 2 IN COUPON**

# TV RADIO SERVICE LIBRARY

**TELLS HOW TO ANSWER RADIO T.V. QUESTIONS**

**HERE IS LATE INFORMATION IN A HANDY FORM FOR RADIO AND TELEVISION REPAIRMEN, SERVICEMEN AND STUDENTS**

TWO COMPLETE VOLUMES – 1568 Pages – 1085 Illustrations and Diagrams. 1001 Important Facts and Figures on Modern T.V., Radio, Electronic Devices. INCLUDES TRANSISTORS & Transistors Circuits, Rectifiers, Record Changers, P.A. Systems, Phonograph Pick-ups, F.M., Auto Radio, Short Wave.

Basic principles, Construction, Installation, Operation, Repairs, Trouble Shooting. How to get Sharp, Clear T.V. Pictures. Install Aerials. How to Test. Explains COLOR SYSTEMS, Methods of Conversion, Terms, etc. Includes Ultra High Frequency. Quick ready reference or use as a home study course. Only $8 for BOTH volumes.

**CIRCLE No. 3 IN COUPON**

# OIL BURNERS

New, complete, explaining in detail both domestic and industrial oil burners. Includes electrical hook-ups and wiring diagrams. Fully covering the theory, construction, installation, operation, testing, servicing and repair of all equipment. Indexed for ready reference. Over 416 Pages. 320 Illustrations and Diagrams. Only $2.50

**CIRCLE No. 28 IN COUPON**

# ALL TYPES OF BLUEPRINT READING

How to read scales, the standard symbols, detail and assembly prints, working drawings, short cuts, helps, hints and suggestions. THE MAN WHO CAN READ BLUEPRINTS IS IN LINE FOR A BETTER JOB. This book gives you the secret language, step by step in easy stages. 448 Pages, Very Fully Illustrated. Priced at $3.

**CIRCLE No. 25 IN COUPON**

# PLUMBERS AND STEAMFITTERS GUIDES

Practical Trade Assistant & Reference Set. Explains in plain language and by clear illustrations, diagrams, charts, graphs and pictures the principles of modern plumbing practice including Pipe Fitting and Air Conditioning. 4 Vols. – 2624 Pages – 3642 Diagrams & Illustrations. Only $9 for the complete set of 4 vols.

Sold individually $2.50 each.

**CIRCLE No. 6 IN COUPON**

# 7-DAY FREE EXAMINATION

SEND NO MONEY – Pay the postman nothing! We are glad to send you any of the Audel Guides for absolutely FREE examination in your own home. We take all the risks and leave all the decisions up to YOU. There is no obligation! If you decide to keep the books of your choice you may pay for them under our astounding easy-pay plan of only $2 a month.

## HERE IS ALL YOU DO

IT'S EASY TO ORDER: In the *No-Risk* Mail Order Coupon at the right just draw a circle around the number of Audel Guides you want us to send you for FREE EXAMINATION. We will send them to you at once to help you build a brighter future by increasing your SKILL. If for any reason at all you are not COMPLETELY satisfied, return the books to us, and that will end the matter!

NO STRINGS OR CATCHES TO THIS OFFER.

**THEO. AUDEL & CO.**

**49 West 23rd Street, New York 10, N.Y.**

# CARPENTERS AND BUILDERS GUIDES

Sold individually $2.50 each.

PRACTICAL STOREHOUSE OF MODERN CONSTRUCTION INFORMATION (4 vol. set) for carpenters and all woodworkers. Explains in easy language and by profuse illustration principles, advances, short cuts, trade secrets, all based on the NEWEST information.

Vol. 1–Tools, steel square, saw filing, joinery, furniture, etc.; Vol. 2–Builders' mathematics, drawing plans, specifications, estimates, etc.; Vol. 3–House and roof framing, laying out, foundations, etc.; Vol. 4–Doors, windows, stair building, millwork, painting, etc. 4 vols. 1904 Pages. 3700 Illustrations. Whole set only $9. **CIRCLE No. 8 IN COUPON**

# PRACTICAL ELECTRICITY

A COMPLETE HANDBOOK–Quick, simplified, ready reference. Complete instruction and practical information on the rules and laws of electricity–Maintenance of Machinery–A.C. and D.C. Motors–Armatures–Wiring Diagrams–House Lighting–Power Wiring–Meters–Batteries–Transformers–etc. Simple to understand. 1052 Pages. 2600 Illustrations. Priced at $5 **CIRCLE No. 4 IN COUPON**

# DIESEL

ALL THERE IS TO KNOW ABOUT MODERN DIESEL ENGINES–Basic principles, starting valves, timing, fuel pumps, fuel injection compressor, air compressors, pistons, cylinders, lubrication, cooling systems, etc. Answers on operation, calculations. 640 Pages. Fully Illustrated. Priced $3.

CIRCLE No. 9 IN COUPON

# MASONS & BUILDERS GUIDES

A PRACTICAL ILLUSTRATED 4 VOL. SET–Explaining in clear, simple language and profuse illustration, principles, advances, short cuts, trade secrets, based on modern practice – including how to figure and calculate various jobs. Vol. 1–Brick work, bricklaying, bonding, designs. Vol. 2–Brick foundations, arches, tile setting, estimating. Vol. 3–Concrete mixing, placing forms, reinforced stucco. Vol. 4–Plastering, stone masonry, steel construction, blueprints. 4 Vols. 1440 Pages. 2067 Illustrations. Complete Set only $9.

**CIRCLE No. 26 IN COUPON** Sold individually $2.50 each.

# MATHEMATICS MADE EASY

A COMPLETE HOME STUDY COURSE–Starting with the first principles of arithmetic, advancing step by step through the various stages of mathematics, including the rules and calculations for mechanical and electrical problems. New EASY correct methods. Includes plane and solid geometry, trigonometry, algebra, calculus, etc. Practical tests, reference tables and data. How to use slide rule. 672 Pages. 550 Illustrations. Priced at only $3.

**CIRCLE No. 11 IN COUPON**

# NEW MACHINISTS AND TOOLMAKERS HANDBOOK

MODERN MACHINE SHOP PRACTICE — For every Machinist, Toolmaker, Draftsman or Student. Tells how to set up and operate lathes, screw and milling machines, shapers, drill presses and all other machine tools. A COMPLETE INSTRUCTOR AND REFERENCE BOOK. 1250 Pages. Fully Illustrated. Priced at only $6

**CIRCLE No. 12 IN COUPON**

# ELECTRIC MOTORS

THIS GUIDE covers the construction, hookups, control, maintenance and trouble shooting of all types of motors. Includes armature winding. Explains entire subject in great detail in simple language. Over 1056 Pages of information. 617 Diagrams. All types of motors fully illustrated and indexed for ready reference. Priced at only $5.

**CIRCLE No. 27 IN COUPON**

# REFRIGERATION & AIR CONDITIONING

FOUR BOOKS IN ONE – basic principles, servicing, operation, repair of: 1. Household Refrigeration. 2. Special Refrigeration Units. 3. Commercial & Industrial Refrigeration. 4. Air Conditioning Systems. A GOLD MINE of essential information. Completely up-to-date. 1360 Pages. Fully Illustrated and Indexed. Priced at only $6. **CIRCLE No. 14 IN COUPON**

# New MECHANICAL DICTIONARY

**THE AUTHORITATIVE WORD BOOK FOR MECHANICS TECHNICIANS AND STUDENTS**

With the revolutionary progress being made today in all mechanical fields, new words and phrases come into use. Any mechanic who wants to be up to date must know this new trade language.

Audels New Mechanical Dictionary gives you all these new words and also the old. Every mechanic will find his job made easier if he knows the exact meaning and use of technical words that come up every day at work. It is an engineer's shop companion and a student's guide.

**PRACTICAL TABLES, FORMULAS, PROCESSES**

Constant use of Audels New Mechanical Dictionary will increase your knowledge and skill in a matter of days without any conscious effort on your part. The right word at the right time is like the right tool — be sure you have it and use it! Defines 17,000 words — terms phrases — rules and formulas, 712 pages only $6.95.

**CIRCLE No. 44 IN COUPON**

# THE NEW ELECTRIC LIBRARY

A COMPLETE ENCYCLOPEDIA explaining in the simplest terms the fundamental principles, rules and applications of applied electricity.

**A COMPLETE COLLEGE EDUCATION!**

Fully illustrated with diagrams and sketches, calculations and tables for ready reference. Questions and answers. Trial tests for practice study and review. All based on the most modern theory.

Vol. 1–Principles and rules of electricity, magnetism, armatures, repairs. No. 15

Vol. 2–Dynamos, DC Motors, construction, installation, maintenance, etc. No. 16

Vol. 3–Testing instruments and tests, storage battery constr. and repairs. No. 17

Vol. 4–Alternating current, power factor, alternators, transformers. No. 18

Vol. 5–A.C. Motors, windings, maintenance, converters, switches, fuses, etc. No. 19

Vol. 6–Relays, condensers, regulators, rectifiers, meters, switchboards, etc. No. 20

Vol. 7–Wiring, house light and power, circuits, high tension, plans, code, etc. No. 21

Vol. 8–Railways, signals, elevators, ignition, etc. No. 22

Vol. 9–Radio, telephone, telegraph, television, motion pictures. No. 23

Vol. 10–Refrigeration, illumination, welding, x-ray, electrical appliances, Index. No. 24

6,000 fully illustrated pages. Priced at only $22.50 for the ENTIRE SET. Also sold individually for $2.50 each.

**WELDERS GUIDE** –Covers Electric, Oxy-acetylene, Thermit, Unionmelt welding for sheet metal, spot and pipe welds, pressure vessels and aluminum, copper, brass, bronze and other metals. Airplane work, surface hardening, hard facing, cutting, brazing, etc. 608 Pages. Fully Illustrated. Only $3.

**CIRCLE No. 10 IN COUPON**

# ADDITIONAL IMPORTANT TITLES

The following Audel Guides are all the best in their fields, written in clear simple fashion, all lavishly illustrated. Circle the numbers wanted in the MAIL ORDER COUPON below. All books are sent for FREE EXAMINATION

| | | |
|---|---|---|
| No. 5 | TRUCK & TRACTOR GUIDE. 1376 Pages | $5.00 |
| No. 7 | PAINTING & DECORATING MANUAL. 417 Pages | 3.00 |
| No. 13 | WIRING DIAGRAMS (Light & Power). 304 Pages | 2.50 |
| No. 29 | SHEET METAL PATTERN LAYOUTS. 1152 Pages | 7.50 |
| No. 30 | SHEET METAL HANDY BOOK. 448 pages | 2.50 |
| No. 31 | MECHANICAL DRAWING GUIDE. 192 Pages | 2.50 |
| No. 32 | MECHANICAL DRAWING & DESIGN. 410 Pages | 3.00 |
| No. 33 | ELECTRONIC DEVICES. 304 Pages | 3.00 |
| No. 34 | ELECTRICIANS EXAMINATIONS. 272 Pages | 2.50 |
| No. 35 | ELECTRIC POWER CALCULATIONS. Page 480 | 3.00 |
| No. 36 | ELECTRIC DICTIONARY. 9000 Terms | 3.00 |
| No. 37 | POWER PLANT ENGINEERS GUIDE. 1568 Pages | 5.00 |
| No. 38 | ENGINEERS AND FIREMANS EXAMS. 544 Pages | 2.50 |
| No. 39 | OPERATING ENGINEERS LIBRARY 3 Book Set | 12.00 |
| No. 40 | PUMPS, HYDRAULICS AND AIR COMPRESSORS. 1760 Pages | 6.00 |
| No. 41 | HOUSE HEATING GUIDE. 966 Pages | 5.00 |
| No. 42 | MILLWRIGHTS & MECHANICS GUIDE. 1248 Pages | 5.00 |
| No. 43 | DO-IT-YOURSELF ENCYCLOPEDIA. 2 Book Set | 8.95 |
| No. 45 | MAGIC OF LANDSCAPING. 128 Pages | 1.49 |
| No. 46 | WATER SUPPLY & SEWAGE DISPOSAL. 436 Pages | 4.00 |
| No. 47 | GUIDE TO CREATIVE PHOTOGRAPHY. 400 Pages | 3.95 |

# MAIL THIS NO-RISK COUPON TODAY!

**THEO. AUDEL & CO. — Self Improvement Publishers Since 1879 —** S3
**49 W. 23rd Street, New York 10, N.Y.**

Please mail me for 7 days' FREE EXAMINATION the books I have circled at right. I agree to mail $2 in 7 days on each book or set ordered, and to further mail $2 a month on each book or set ordered until I have paid the purchase price, plus shipping costs. If I am not completely satisfied with my Audel Guides I may return them.

NAME_____

ADDRESS_____

OCCUPATION_____

EMPLOYED BY_____

☐ **SAVE SHIPPING COSTS!** Check here if you enclose complete payment with order. We pay postage charges. You have same return privilege.

| | | | | |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |
| 6 | 7 | 8 | 9 | 10 |
| 11 | 12 | 13 | 14 | 15 |
| 16 | 17 | 18 | 19 | 20 |
| 21 | 22 | 23 | 24 | 25 |
| 26 | 27 | 28 | 29 | 30 |
| 31 | 32 | 33 | 34 | 35 |
| 36 | 37 | 38 | 39 | 40 |
| 41 | 42 | 43 | 44 | 45 |
| 46 | 47 | | | |



Copyrighted material

# MEN PAST 40

## Afflicted With Bladder Trouble, Pains in Back, Hips, Legs, Nervousness, Tiredness.

If you are a victim of these symptoms, your trouble may be due to Glandular Inflammation. A constitutional Disease that requires special types of medical treatment. Neglect of such Inflammation causes men to grow old prematurely and before their time.

Most men, if treatment is taken in time, can be successfully NON-SURGICALLY treated for Glandular Inflammation. If the condition is aggravated by lack of treatment, surgery may be the only chance.

## NON-SURGICAL TREATMENTS

The NON-SURGICAL New Type treatments used at the Excelsior Medical Clinic are the result of discoveries in recent years of new techniques and drugs, plus over 20 years research by scientific technologists and doctors.

Men from all walks of life and from over 1,000 communities have been successfully treated here at Excelsior Springs. They found soothing and comforting relief and new health in life.

### EXAMINATION AT LOW COST

When you arrive, our Doctors, who are experienced specialists, make a complete examination. You then decide if you will take the treatments needed, which are so mild, hospitalization is not needed—a considerable saving in expense.

### RECTAL-COLON

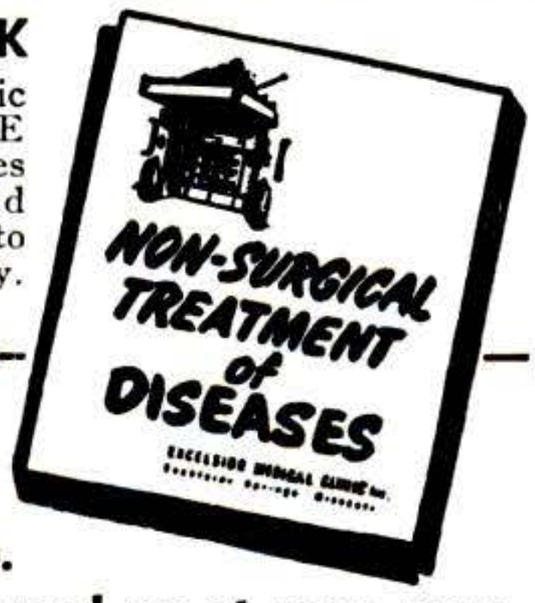
**Are often associated with Glandular Inflammation. These disorders, we can successfully treat for you, at the same time we treat Glandular Inflammation.**

### REDUCIBLE HERNIA

**Is also amenable to a painless Non-Surgical treatment that we have developed. Full details of this treatment given in our Free Book.**

### Write For FREE BOOK

The Excelsior Medical Clinic has published a New FREE Book that deals with diseases peculiar to men. It could prove of utmost importance to your future life. Write today. No obligation.




**EXCELSIOR MEDICAL CLINIC**
**Dept. B6251**
**Excelsior Springs, Mo.**

**Gentlemen: Kindly send me at once, your New FREE Book. I am interested in full information. (Please Check Box)**

☐ Glandular Inflammation ☐ Hernia ☐ Rectal-Colon

Name.....

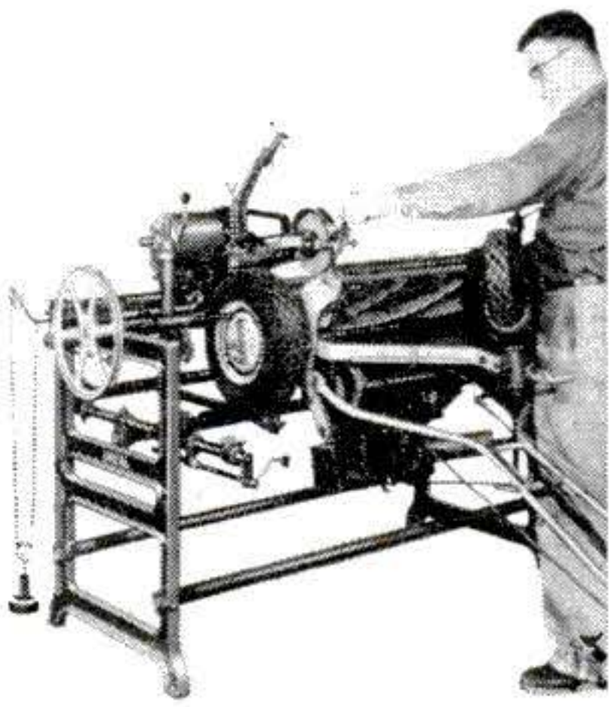
Address.....

City.....State.....

# NEW IDEAL 900 LAWNMOWER SHARPENER

***with "Two-Way" Grinding Option means big volume and big profit for you!***

Unit sharpens any reel-type mower either by "hook" or "straight-line" method — for top versatility. Gravity feed. Screw-type adjustments. ½ h.p. motor. 6-inch grinding wheel. Includes: Bedknife grinder, reconditioner and Tool Tray.



***Write today for full details!***

**The Fate-Root-Heath Company, Dept. PS-3, Plymouth, Ohio**

# ENGINEERING HOME STUDY COURSES

Courses written by world authorities in all branches of engineering and science. Step-by-step instructions using methods proved successful by thousands of our graduates. One hour each day in your spare time will start you off to higher pay, security and prestige. Fill in the coupon to-day and indicate the course of interest. We will send you a complete outline of the course with a booklet describing the Institute and our advanced teaching methods.

CIVIL ENG.
SURVEYING
ARCHITECTURE
FORESTRY
STRUCTURAL
MECHANICAL ENG.
INDUSTRIAL ENG.
REFRIGERATION
DRAFTING
ELECTRICAL ENG.
RADIO
ELECTRONICS
TELEVISION
AERONAUTICAL ENG.
HIGH SCHOOL
CHEMICAL
MATHEMATICS
ACCOUNTING

## MAIL THE COUPON TODAY

Canadian Institute of Science & Technology Ltd.,
766 Century Bldg., 412, 5th St. N.W., Wash., D.C.

NAME.....

ADDRESS.....

CITY.....STATE.....

COURSE OF INTEREST.....

Canadians: Send to C.I.S.T., 766 Garden Bldg., 263 Adelaide St. W., Toronto, Ont.

**C. I. S. T.**

594



Copyrighted material

# THIS MAN IS ON THE WAY UP

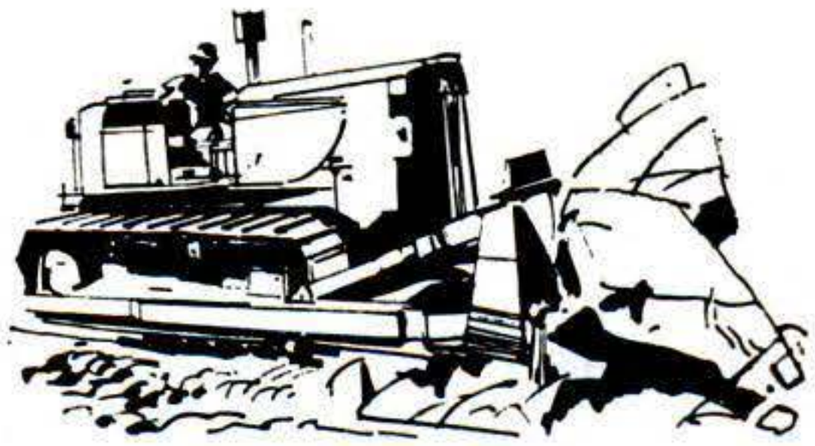
## —and you can be too, with *training*

Get ahead in

## HEAVY EQUIPMENT OPERATION

through quick, intensive home study *plus* actual experience on modern equipment. Train on easy budget terms, while holding present job.

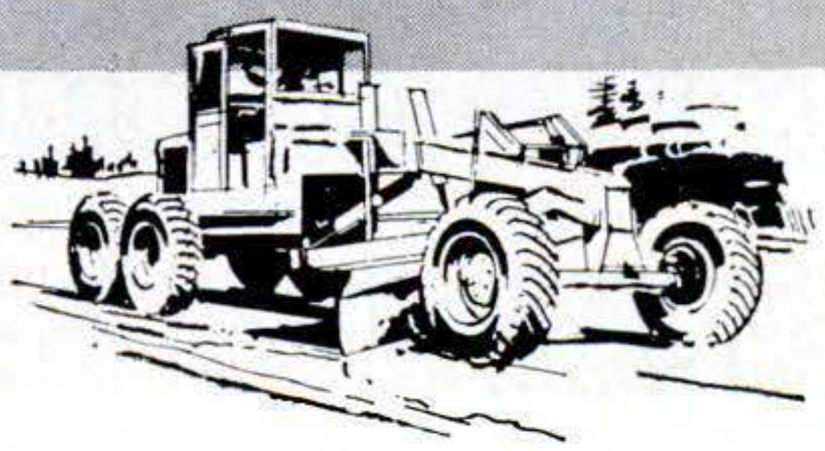
Without obligation, you can find out how to quickly and thoroughly "broaden the base" of your technical and engineering experience. Men already in the heavy equipment field, with the training and "push" to rise higher, are needed to carry on the enormous multi-*billion* dollar highway and building programs now under way all over America. Thousands of bigger jobs, higher-pay jobs, opening constantly. They will be filled by men with skills, training, eagerness to get ahead. *Many will be graduates of this school.* Northwest graduates are filling some of these bigger jobs now.



**NEW TRAINING PROGRAM INCLUDES COVERAGE OF:**

| | |
|---|---|
| Engineering Fundamentals | Blueprint Reading |
| Highway Construction | Operating Controls |
| Grade and Grade Stakes | Estimating |
| Actual Work on Equipment | Field Maintenance |

**ACCEPT FREE OFFER: Send now for low tuition rates, easy budget plan and complete information, plus an interesting booklet with stories typical of what our graduates are doing. No obligation. No red tape. You will be personally interviewed. WRITE NOW.**



**HEAVY EQUIPMENT TRAINING**
Northwest Schools, Inc. **Dept. S-11**
1221 N. W. 21st Avenue, Portland 9, Oregon

Name_____

Address_____

City_____ State_____

County_____ Phone_____

Education_____ Age_____

## NORTHWEST SCHOOLS

**PORTLAND • HOLLYWOOD • CHICAGO**

**A National Training Institution — Founded 1946**



Copyrighted material

# "MADE $1200 ON ONE JOB"

*Some make more, some less...*

**We help you start Your Own All-Year Business**

***Make BIG Money!*** With our easily operated, highly efficient wall washer, G. H. Jones made $1200 on one school job. E. L. Goss took in more than $10,000 in one year. E. C. Taber wrote, "*I made $400 gross in two weeks.*" And no wonder...this machine washes walls 6 times faster and better than by hand—with no mess...no drop cloths.

**Your Money-Making Opportunity** • We want more men to go into this profitable business for themselves and enjoy independence—freedom from layoffs and bosses. Customers everywhere—homes, offices, schools, churches, hotels, etc. How much you earn depends largely on you. What you take in is mostly profit. No need to rent shop or office; operate from home. Start spare time until full time is justified.

***Lose No Time — Send Coupon Today for All the Facts***

**FREE BOOK! MAIL COUPON TODAY!**

**VON SCHRADER MFG. CO.**
**311 "W" Pl., Racine, Wisconsin**

Send at once (no obligation) your **FREE** booklet containing information about your WALL WASHING MACHINE and how I can start my own permanent, profitable business.

Name_____

Address_____

City_____ Zone____ State_____

# 4⅛" JOINTER-PLANER

**NOW ONLY $19.95**

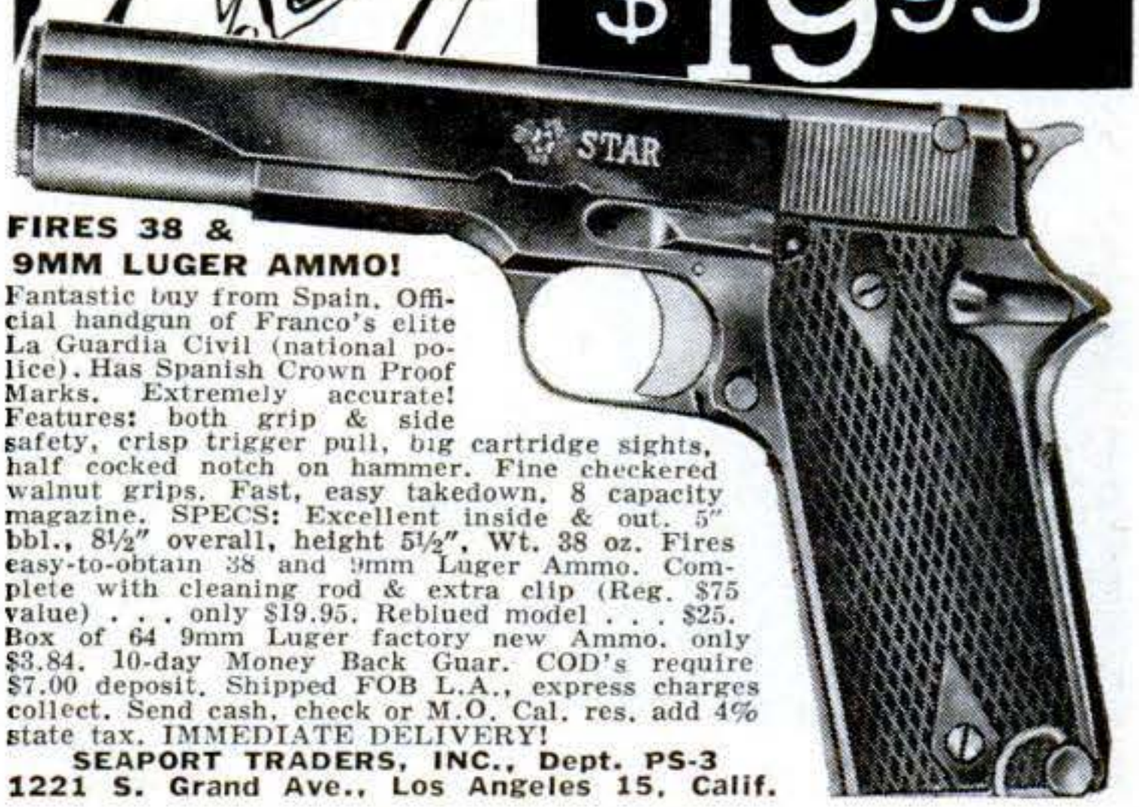
**YOU SAVE FROM $20 to $40**

Complete as shown

Top quality jointer-planer planes, rabbets, bevels; makes gluing jobs and tapering cuts accurate and fast. Never before offered for so low a price. All iron and steel construction, precision ground cast tables, rugged cast iron base. You get same accuracy and capacity as machines costing from $20 to $40 more. Adjustable depth of cut; rabbet depth ⅜". Patent pending fence assembly completely adjustable to any position or any angle 0° to 50°. And what's more, this fine machine is a big 22" long and is unconditionally guaranteed for TEN YEARS. (Satisfaction guaranteed or money refunded.) Send check or M. O. or, sent C.O.D. ($3 deposit, please.) All machines sent express collect. Act right now on this special bargain.

**AMERICAN MACHINE & TOOL CO.**
**ROYERSFORD 65, PENNA.**

# 38 SUPER, 9mm STAR AUTO. $19.95




**FIRES 38 & 9MM LUGER AMMO!**

Fantastic buy from Spain. Official handgun of Franco's elite La Guardia Civil (national police). Has Spanish Crown Proof Marks. Extremely accurate! Features: both grip & side safety, crisp trigger pull, big cartridge sights, half cocked notch on hammer. Fine checkered walnut grips. Fast, easy takedown. 8 capacity magazine. SPECS: Excellent inside & out. 5" bbl., 8½" overall, height 5½", Wt. 38 oz. Fires easy-to-obtain 38 and 9mm Luger Ammo. Complete with cleaning rod & extra clip (Reg. $75 value) . . . only $19.95. Reblued model . . . $25. Box of 64 9mm Luger factory new Ammo. only $3.84. 10-day Money Back Guar. COD's require $7.00 deposit. Shipped FOB L.A., express charges collect. Send cash, check or M.O. Cal. res. add 4% state tax. IMMEDIATE DELIVERY!

**SEAPORT TRADERS, INC., Dept. PS-3**
**1221 S. Grand Ave., Los Angeles 15, Calif.**

# IT'S EASY TO ROLL OUT THIN LINES with *Master*® PAINT STRIPER

**You can do professional striping on furniture, boats, autos, bikes, plywood, etc. Master Striper rolls out uniform lines on wood, glass, plastic, ceramics, almost any surface with paint, temperas, glue, textile-paint or underglaze; also used in industry.**

| | |
|---|---|
| TYPE M Tool with 1/16" roller tip | $1.50 |
| Other size Tools (1/64", 1/32", 3/64", 5/64", 3/32", 1/8") ea. | 2.00 |
| Extra Roller Tips, Sizes above, ea. | 1.00 |
| Extra Roller Tips, 1/4" ea. | 1.25 |
| Special complete set with 7 tips, only | 5.50 |
| DOUBLE STRIPE KIT—5 combinations | 3.50 |

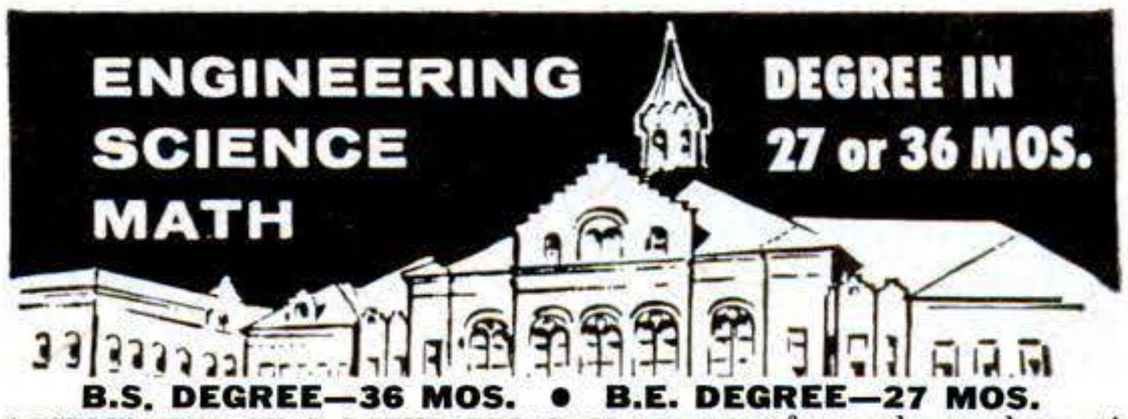
(COD's. Postage Collect)

**MAKES CLEAN, STRAIGHT OR CURVED LINES; VARIOUS WIDTHS AVAILABLE.**

**Dealers: write today!**

**WENDELL MFG. CO.,** 4234 LINCOLN AVE. DEPT. 41 CHICAGO 18, ILL.

# ENGINEERING SCIENCE MATH — DEGREE IN 27 or 36 MOS.



**B.S. DEGREE—36 MOS. • B.E. DEGREE—27 MOS.**

ACCELERATED YEAR-ROUND PROGRAM prepares for early employment in fields of SCIENCE AND ENGINEERING. Regular 4-year program for B.S. Degree completed in 36 months, special engineering degree program in 27. Classes start March, June, July, September, January. QUALITY EDUCATION. Graduates employed from coast to coast. Government approved for veteran training. Students from 50 states, 40 countries. 20 buildings; dorms, gym. Campus. SAVE TIME AND MONEY. EARN BOARD while studying.

Write for catalog and complete information.

**INDIANA TECHNICAL COLLEGE**

631 E. Washington Boulevard, Fort Wayne 2, Indiana

Please send me free information on Bachelor's Degree Programs in Engineering and Science as checked below:

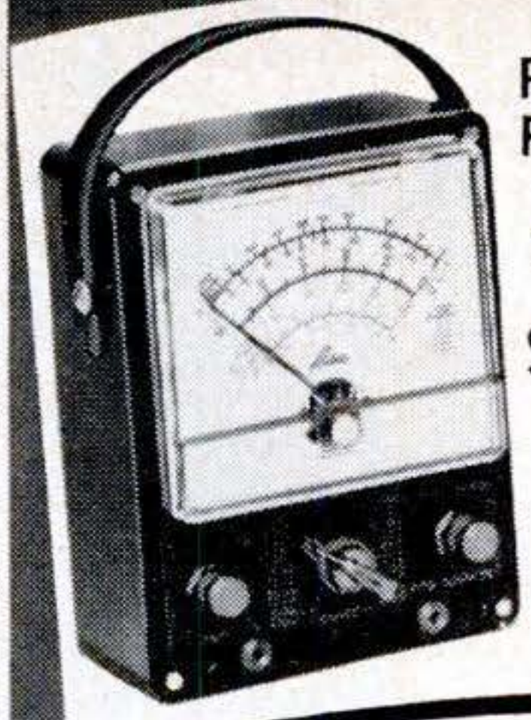
- ☐ Aeronautical Engineering
- ☐ Chemical Engineering
- ☐ Civil Engineering
- ☐ Electrical Engineering
- ☐ Electronic Engineering
- ☐ Mechanical Engineering
- ☐ Metallurgical Engineering
- ☐ Physics
- ☐ Chemistry
- ☐ Mathematics

Name_____

Address_____



Copyrighted material



## REALISTIC PORTABLE V-O-M TEST KIT

**$12.95**

$2 down
Easy to Build

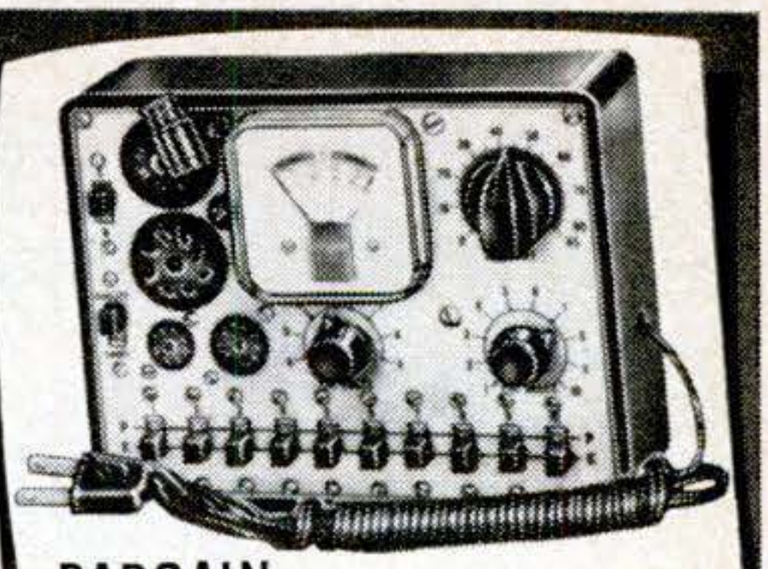
Our own exclusive low priced portable test instrument kit! Efficient, accurate, stable. Checks batteries, line voltage, tests continuity of circuits. Ideal for home repair of TV, radio, appliances. 4½" easy-to-read meter face dial and 400 μa movement. 14 AC/DC scales to 5000 V. 8 AC/DC current scales. 3 ohms scales! 6 db scales, 6 output scales. 6¾x5¼x3" bakelite case. Simple instructions. Ship. wt. 3 lbs.
**No. 4-96L079**—Mailable.. **$12.95**

$5 down

## Gonset G-11 Citizen's Band 2-Way Radio $84.50

Exclusive special purchase to sell at $40 off net price while they last! Famous Gonset "communicator" transceiver transmits, receives within 25-mile range! For car, tractor, boat, plane—or fixed station. Press button to talk, release to listen. Ceramic mike, crystals for 1 channel. Noise eliminator, adjustable "squelch." Mounting bracket. No exam needed—fill out FCC form for license.

**No. 4-45DX785**—117 VAC 3303
**No. 4-45DX786**— 12 VDC 3304
(Express, ship. wt. 10 lbs.) .. **$84.50**

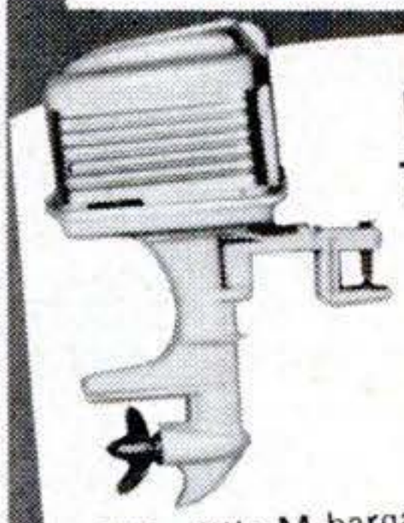


## BARGAIN PORTABLE TUBE CHECKER KIT $14.80

$2 down

Weighs only 2¼ lbs., yet performs like larger, costlier units! Tests octal, loctal, 9-prong, 7-prong miniature tubes for radio, hi-fi, TV. Tests emission, shorts, leaks, opens, intermittents. Easy-to-read meter. Complete with tube chart, operating manual. Operates on 105-130 VAC, 60 cycles. Precision crafted—ideal for radio-TV servicemen, technicians, amateurs. Wt. 3 lbs. Mailable.

**No. 4-94L002**-Kit..... **$14.80**
**No. 4-94L001**-Wired.....**$18.80**



## MERCURY-M TYPE MODEL OUTBOARD MOTOR 99c

This little M bargain turns your model boat into a speed demon! Lightweight die-cast aluminum construction, battery operated on 1.5 to 4.5 volts. Has battery clips, switch lever, swirl mount, stern clamps. 4 in. high.
**No. 4-98L366**—Ship. wt. 8 oz. Mail . **99¢**

## ELECTRONIC PARTS 88c pkg.

50 PIGTAIL RESISTORS—shown. ½ watt size with long axial leads. Std. color code.
**No. 4-95L167**—Ship. wt. 1 lb... Pkg. **88¢**

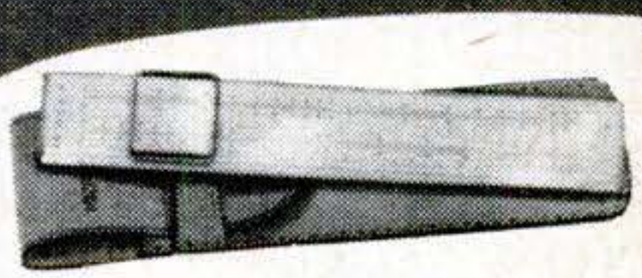
25 CERAMIC DISCS. Popular sizes. Made by Centralab, Sprague, etc. For all builders.
**No. 4-95L283**—Ship. wt. 1 lb... Pkg. **88¢**

25 MICA CONDENSERS including silver and standard RMA and JAN types.
**No. 4-95L146**—Ship. wt. 1 lb... Pkg. **88¢**

Above packages mailable

# Save money ON GUARANTEED EQUIPMENT AND PARTS from RADIO SHACK

Order Direct from this page



## 5" POCKET SLIDE RULE In Leather Case $2.69

Sturdy 9-scale bamboo slide rule by Micronta performs most functions of $7 rules! Multiplies, divides, calculates squares, sq. roots, cubes, cube roots. Reference equivalents, formulae on back. Wt. 2 oz.
**No. 4-97L820**—Mail. **$2.69**

# RADIO SHACK

Corporation

where millions of hobbyists and pros shop by mail

**730 Commonwealth Avenue**
**Boston, Massachusetts**

## Immediate Delivery! Use this handy order blank

**RADIO SHACK CORP.** Dept. 61C4
730 Commonwealth Ave., Boston, Massachusetts

☐ Check or M.O. enclosed for full amount
☐ Open an Easy Budget Account for me. Check or M.O. enclosed for down payment

Your Name _____
print
Street _____
City _____ Zone _____ State _____

| Item No. | Quantity | Name of Item | Unit Price | Total |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |

Total cost of items _____

(Down Payments: $2 down on orders up to $45; $5 down on orders $50 to $180. Add postage charges; all excess refunded. All items mailable except 2-way radio shipped express delivery charges collect.)



Copyrighted material

***Earn up to $1,000 a Month. Car Furnished.***

# Compare THIS Job to the One You Have NOW

***Then, if you'd like to switch, I'll Show You How to DO It***

Yes, I'll show you how to get into one of the best paying professions in America today—Auto Claim Investigating. Here's why employers are glad to pay top salaries to men in this particular field.

This year more than 25 million auto accident claims will have to be settled! No wonder Auto Claim Adjustors are so greatly needed. No wonder insurance companies pay as much a $450 a month to start; provide a private office, a secretary, and a car for personal use—all expenses paid! That's why the money-making opportunities in this exciting field are so great. Even if you have only an average education you can go far in this exciting new profession. Let me teach you at home by mail. In a few weeks you can learn enough to get on the road to a five-figure salary. You can either work for yourself or for a big reliable company. No need to change your location. No tedious office hours! We even supply FREE employment help. You owe it to yourself to find out all about this interesting profession. Get in touch with me right away. ERIC P. McNAIR, LIBERTY SCHOOL OF CLAIM INVESTIGATING, Dept. 23, Libertyville, Illinois.

**SIMPLY MAIL THIS COUPON NOW!**

**Eric P. McNair, *President*, Dept. 23**
**LIBERTY SCHOOL OF CLAIM INVESTIGATING**
**Libertyville, Illinois**

Tell me how I can become an Auto Claim Investigator. Please send me your big FREE Booklet, "20 Steps to Success" and show me full details on how to get started.

My Name _____

Address _____

City _____ Zone _____ State _____

---

**Want BIG PAY—Your Own Business?**

**Be a LOCKSMITH**

You can quickly step into a well-paid job or start a big-profit business of your own. Shortage of locksmiths means opportunities everywhere, spare-time or full-time—in good times or bad.

**EARN EXTRA MONEY FROM THE START!**

**All Special Tools, Supplies Furnished Free**

Age, education, minor physical handicaps don't matter in this growing, steady-income trade. You learn fast at home—gain practical experience through well-illustrated lessons. You do real jobs under the personal guidance of experts.

**ILLUSTRATED BOOK—FREE**

For a future as your own boss, or in a big pay job, send for FREE illustrated book today. No salesman will call. Only school of its kind. Lic. State of N. J.; Accredited Nat'l Home Study Council. **Vet Approved. LOCKSMITHING INSTITUTE, Dept. 203-1B, (Div. Technical Home Study Schools) 150 Park Avenue, E. Rutherford, N. J.**

**MAIL COUPON NOW**

**Locksmith Inst., Dept. 203-1B, 150 Park Avenue, E. Rutherford, N. J.**
Please send FREE and without obligation Illustrated Book.

Name _____

Address _____

City _____ Zone _____ State _____

---

# PROTECT YOURSELF

**with this Fountain Pen-Type POCKET**

# TEAR GAS

**DEVICE . . . $15 VALUE** 38 Special Cal.

**$6.95** with 1 shell — Exp. Col. Additional shells 50c ea.

For police or civilian defense against robbers, mashers, etc. Causes no permanent injury. Highly polished heavy nickel case with spring-steel pocket clip.

**SEND CHECK OR MONEY ORDER. NO COD's**

Nickel Plated Peerless Type **HANDCUFFS** $15.00 value SPECIAL **$7.95** pr.

Deluxe leather carrying case $2.50

Registered Colt Distributors Suppliers for Official Police Equipment

This Product is not intended for sale in states or localities which have laws forbidding their sale.

**PUBLIC SPORTS SHOPS, *DEPT. P-1* 11 S. 16th St., Phila. 2, Pa.**

---

**100 POUND SET $12.80**

**Extra Plates Only 12c Pound**

# BARBELLS

**140-Pound, CHROME DELUXE** Barbell-Dumbbell set only **$19.80.**
**This is our feature set and is the finest ever manufactured.**
Training with adjustable weight is the **BEST** way to keep fit; the **ONLY** way to develop great strength and a perfect body. As the oldest and best equipped barbell company. BUR gives value and prices no one can equal.

**SEND FOR FREE CATALOG.**
**BUR BARBELL CO.**
**Lyndhurst 5, New Jersey**

---

# WOODWORKING

**LOW COST HOME TRAINING COURSE FOR BEGINNERS & ADVANCED CRAFTSMEN**

Make money. Learn skills and secrets of fine woodworking and tool use. Professionally prepared shop method training tells and shows how. Covers everything. Easy to master.

Write for Free Booklet

**INTERSTATE TRAINING SERVICE**
**DEPT. F-2, PORTLAND 12, OREGON**

---

## Finish HIGH SCHOOL at Home

*in spare time.* Progress at your own speed. Many finish in 2 years. Equivalent to resident school—prepare for college entrance exams. Standard H.S. texts furnished. Credit for subjects already completed. Single subjects if desired. Diploma awarded.

*Write today for Free Bulletin!*

**AMERICAN SCHOOL, Dept. H346, Drexel at 58th, Chicago 37**

---

# The BIG BOOK of FIREPLACES

**76 Pages!** **INDOOR!** **OUTDOOR!** **For Warmth!** **For Cookery!**

**Barbecues!** **Building Tips!** **Plans, Ideas!** **Designs!** **Materials!** **200 Illustrations!**

**Send $1.00 for prompt post paid delivery**
**The Majestic Co., Inc., 541 Erie St., Huntington, Ind.**



Copyrighted material

# Shrinks Hemorrhoids New Way Without Surgery Stops Itch – Relieves Pain

For the first time science has found a new healing substance with the astonishing ability to shrink hemorrhoids and to relieve pain — without surgery.

In case after case, while gently relieving pain, actual reduction (shrinkage) took place.

Most amazing of all — results were so thorough that sufferers made astonishing statements like "Piles have ceased to be a problem!"

The secret is a new healing substance (Bio-Dyne®)—discovery of a world-famous research institute.

This substance is now available in *suppository* or *ointment form* under the name *Preparation H®*. Ask for it at all drug counters.

## NO JOB WORRIES

PLASTEX INDUSTRY needs manufacturers on small scale for big production of Lamps, Clock Stands, Art Goods, Novelties in Plastic Marble imitation. No Experience necessary. ½c material makes regular 10c store sellers. Moulds furnished for fast production. Small investment brings good profit. Big wholesale orders now being placed. Ambitious men have chance for real prosperity and job security. Our NEW FREE booklet will interest and benefit you.

PLASTEX INDUSTRIES, Dept. 2, 3400 Third Ave., New York 56, N. Y

## 75 POWER TELESCOPE 25X-45X-75X $3.98

New 3 in one telescopes, 3 variable 25X-45X-75X magnification, Brass bound, 25 power for ultra bright images 45 & 75 power for long range. Guaranteed to bring distant stars, moons, objects, sports 75 times closer. powerful scope sold anywhere near this amazing low price. American made, 5 sections. Opens 36" closes 1 ft; contains 4 ground & polished lenses. Can also be used as powerful compound microscopes. Directions included. Mass production enables us to offer telescope complete at $3.98 postpaid. Money back guarantee. Get yours now.

CRITERION CO., Dept. PSB-93, 331 Church St., Hartford, Conn.

## It's EASY to be TALLER

### Why be Average?

Now you can be dramatically taller...it's just as easy as stepping into a pair of "ELEVATORS"! These amazing shoes instantly add that all-important height you need to make you a BIG man . . . give you the boost you need to command the respect of everyone! And it's **your** secret because smartly-styled "ELEVATORS" look and feel like other fine shoes! Give yourself a lift—mail coupon NOW! Send for Free Booklet illustrating 34 styles TODAY!

THE ORIGINAL AND GENUINE ELEVATORS* TRADE MARK HEIGHT-INCREASING SHOES "YOUR PERSONAL PEDESTAL" * TRADE MARK OF STONE-TARLOW CO., INC.

BROCKTON FOOTWEAR, INC.
Dept. 1103B, BROCKTON 68, MASS.

Please send Free Booklet and name of nearest dealer. I understand this will be held in strict confidence and no salesman will call.

NAME _____
PLEASE PRINT

ADDRESS _____

CITY _____ STATE _____



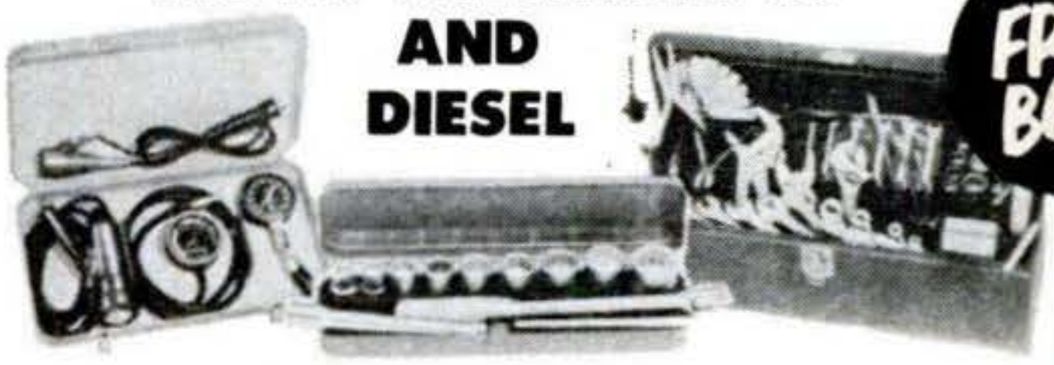
# SEND FOR FREE BOOK ON YOUR FUTURE IN THESE GROWING INDUSTRIES

## ELECTRONICS TELEVISION RADIO

FREE BOOK

More money . . . security . . . prestige . . . all yours in this booming industry. Go into your own TV Service business . . . into missiles, automation, industrial electronics, and many other fields. Free book tells how thousands have trained at home for a successful, secure future . . . how you can earn as you learn. **Send coupon now!**

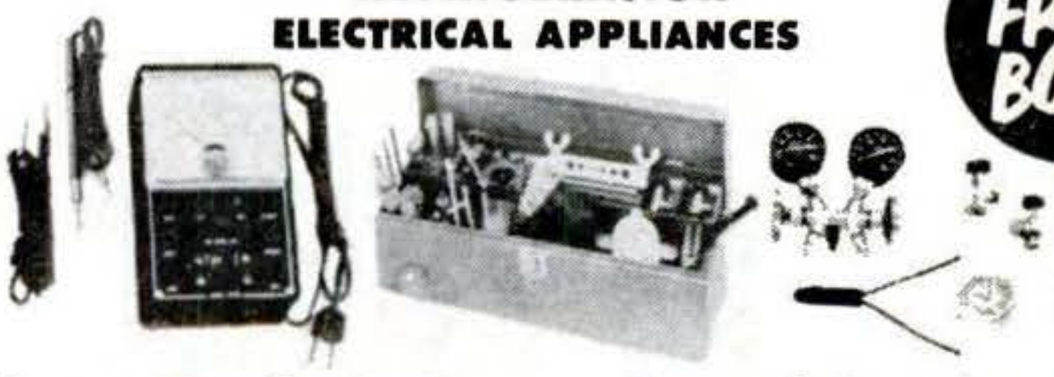
## AUTO MECHANICS AND DIESEL



FREE BOOK

**Fast, Right, Easy** . . . that's how National Technical Schools trains you for top pay jobs in service and maintenance, motor tune-up, diesel mechanics, foreign car service, and many other fields. Training complete . . . industry recognized, classroom developed, lab and shop tested. Send for Free Book now. **Clip coupon.**

## AIR CONDITIONING REFRIGERATION ELECTRICAL APPLIANCES



FREE BOOK

**Increase Your Earning Power** . . . Master all three phases in one low-cost course at home. Free book describes unlimited opportunities, training methods and equipment you get to keep. Course pays for itself in Spare-Time-Income while training. **Mail coupon now.**

ACCREDITED MEMBER

NATIONAL TECHNICAL SCHOOLS
4000 South Figueroa Street, Los Angeles 37, California

Select one of the "Big 3" now!

CHECK ONE

NATIONAL TECHNICAL SCHOOLS
WORLD-WIDE TRAINING SINCE 1905

**National Technical Schools, Dept. C-31**
**4000 S. Figueroa St., Los Angeles 37, Calif.**

Please rush FREE Book and Actual Lesson checked below. No obligation. No salesman will call.

☐ TV-Radio-Electronics Book
☐ Auto-Mechanics & Diesel Book
☐ Air Conditioning, Refrigeration & Electrical Appliance Book

Name _____ Age _____

Address _____

City _____ Zone ____ State _____

☐ **Check here if interested ONLY in Resident Training at L.A.**

VETERANS: Give date of discharge _____

# FREE!

## Trial lesson in DRAFTING

### LEARN AT HOME IN SPARE TIME

Check the want ads in any newspaper—SEE the big-pay opportunities open to you as a draftsman. What's more, you can learn this well-paid, prestige profession at home—quickly, easily! No special talent needed! Get complete, step-by-step Chicago Tech lessons in the mail, spend a few pleasant hours studying each week. In a short time you'll be a well-trained draftsman, ready to take your pick of many good jobs. Act now!

**FREE INFORMATION—MAIL COUPON TODAY!**

Get FREE TRIAL LESSON plus information about C.T.C. practical training. Learn what successful Chicago Tech graduates say about high pay and opportunities in drafting. No charge, or obligation.

**Accredited National Home Study Council**

**CHICAGO TECHNICAL COLLEGE**

**C-231 Tech Bldg., 2000 So. Michigan Ave.**
**Chicago 16, Illinois**

Mail me FREE Lesson with information about big opportunities in DRAFTING.

Name .....Age .....

Address .....

City .....Zone....State.....

# Play Right Away!

## ANY INSTRUMENT

Now it's EASY to learn ANY INSTRUMENT—even if you don't know a single note now. No boring exercises. You start playing delightful little *pieces* RIGHT AWAY—from very first lesson! Properly—by note. Simple as A-B-C. You can make amazing progress—at home, in spare time without teacher. Only few cents per lesson. 1,000,000 students all over the world. *(Est. 1898—Licensed by N.Y. State Education Dept.)*

**FREE BOOK** Shows how easily you can learn music. Write for it. No obligation, no salesman will call. **U. S. SCHOOL OF MUSIC, Studio A153, Port Washington, New York.**

**COMPLETE NEW FALSE PLATE IN 24 HOURS**

**SEND NO MONEY**
—Just rush name and address for full **free details.** Act Today.

**FROM YOUR OLD $15.95**
***NOW LOW AS . . .***
**New process transforms broken or loose plates into new lightweight plastic plates. NO IMPRESSION NEEDED.** Money Back Guarantee.

**TRU-GRIP DENTAL LABS.,** 127 N. Dearborn St., Dept. 5, Chicago 2, Ill.



# ELECTRONICS

## HOME STUDY COURSE AT A PRICE YOU CAN AFFORD!

INCLUDES: 60 BIG Lessons and 60 Examinations. 9 Electronics Kits including all tubes and batteries. You build power pack, Oscillator, Radio set, and Multimeter.
COVERS: Basic Electronics, Computers, Semiconductors, Transistors, Electronic timers and many others.

**WRITE: SIMPLIFIED ELECTRONICS DEPT.PS-31**
**815 E. Rosecrans Ave., Los Angeles 59, Calif.**

**JUST $5.00 STARTS YOU**

**ONLY $75.00 COMPLETE COST! No Extras To Pay For**

**get into operating or repairing**
## EARTH MOVING EQUIPMENT

Men needed now for good paying jobs in booming road and construction work. Learn *operating* or *repair-rebuilding* of heavy road machinery, cranes, bulldozers, earth carriers, etc. Actual "on the job" training. 5 to 13½ week courses. Classes start every Monday. Reserve your space now. Complete catalog and reservation facts FREE. Approved for veterans. Write

**Greer TECHNICAL INSTITUTE**
**Attn.: S.C. Hutch, Box 368, Braidwood, Ill.**



*If you take*

# Color Pix

**8mm - 16mm - 35mm 127 • 120 • 620**

***You must get our* MONEY SAVING**

# Free Catalog

**Listing all popular KODAK and ANSCO Film Type and Sizes . . . WRITE TODAY!**

**SOLAR CINE PRODUCTS, Inc.**
**4247 S. Kedzie • Chicago 32,**
"Direct-by-Mail" Film and Processing Specialists for almost a quarter century" **Dept. PSM**




Copyrighted material

# NOW YOU'LL REALLY KNOW HOW TO FIX ANY PART OF ANY CAR!

These famous Chilton manuals—by the world's largest automotive publishers—provide an easily understood, time-saving approach to servicing, maintaining or rebuilding practically any car on the road. Money-Back Guarantee!

## New! Down-to-earth Service Guide to all leading makes!

This 4 lb., 925-page GLENN'S AUTO REPAIR MANUAL with its 3000 how-to-do-it pictures and hundreds of thousands of car repair facts has been specifically designed to correct the shortcomings of ordinary manuals. Helps you find the exact information you want in a jiffy. Leads you right to the seat of the trouble—then shows you how to make needed repairs, adjustments or parts replacements. Explains things so you can hardly fail to understand—**even if you've never fixed a car before.**

Includes specs and repair details for all leading American makes FOR 12 YEARS! Has a complete electrical section with all chassis and accessory circuit diagrams. More than 100 pages with 348 pictures are devoted to modern carburetors and fuel injectors. Over 100 models of 35 foreign cars are covered in detail. There is a big Volkswagon section.

## 78-PAGE TROUBLESHOOTING GUIDE

### *makes it easy to find what's wrong!*

No guesswork. No lost time. Glenn's helps you locate troubles fast and surely—something other manuals usually neglect. Quick-guide trouble-spotting charts make things doubly easy. Special photos of worn parts show how and where wear occurs. Step-by-step charts show how to proceed. Short cuts and cautions are pointed out. You get down-to-earth, fully illustrated instructions on Engines; Air Conditioning; Axles; Bodies; Brakes; Clutches; Cooling; Electrical & Fuel Systems; Manual & Power Steering; Transmissions; Overdrives; Universals; Drive Shafts; Tune-ups . . . AND ALL THE REST. Practice from GLENN'S for 7 days at our risk. Price only $7.95. Money-back guarantee!

**THE MOST COMPLETELY NEW AND DIFFERENT AUTO REPAIR MANUAL IN 20 YEARS!**

## KEEP OLD MOTORS RUNNING LIKE NEW!

**This complete guide to service and rebuilding shows you how!**

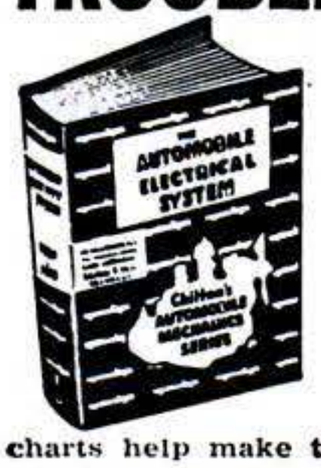
Don't discard old motors too soon! Keep them purring like new! 98% of the things that happen to engines can be fixed—and Chilton's big 470-page specialized ENGINE REBUILDING & MAINTENANCE Manual teaches you how. It is a master guide for mechanics, hot rodders and conversion fans who want to learn to handle any engine job by modern professional methods. Helps you recondition old engines to run like new. Complete easy instructions include taking engines apart; reassembling and testing; locating and repairing cracks; all grinding, boring, sleeving and gauging operation; parts replacement; adjusting . . . and all the rest. Shows what tools to use . . . what mistakes to avoid . . . what alternate methods to try. It is a complete guide to motor troubleshooting, servicing and rebuilding. Over 466 pictures. $7.95.

## DON'T LET POWER ACCESSORIES "STUMP" YOU!

**This manual takes the headaches out of the toughest jobs!**

Chilton's new 235-page specialized AUTOMOBILE POWER ACCESSORIES Manual brings you the complete "low-down" on keeping these popular devices in top-notch working order. Painstakingly detailed, fully illustrated troubleshooting and repair procedures cover power brakes; power steering; power seats; retractable and convertible tops; air suspension systems; electrically-operated windows and heaters—plus a complete section on air-conditioning! You learn exactly how and why each power unit works. Handy charts indicate the causes of different troubles and show you just what to look for. Over 279 pictures. Disassembling, adjustments, parts replacement, reassembling and testing are clearly explained. $7.95.

## LOCATE CAR ELECTRICAL TROUBLES FAST..fix 'em right




A big percentage of all car troubles are electrical and many of them can be pretty puzzling if you haven't had specialized training like this. Chilton's new AUTOMOBILE ELECTRICAL SYSTEM Manual covers every step of the work—with special emphasis on helping you locate troubles in less time and repairing them by time-saving professional methods. Each procedure is clearly explained and more than 370 helpful pictures, diagrams and charts help make things doubly clear. Covers Circuits; Batteries; Lighting; Ignition; Generators; Regulators; Starting Motors; Instruments and Gauges; Horns; Windshield Wipers; Switches; Circuit Breakers—even Car Radios. Price $7.95.

## PRACTICE 10 DAYS FREE!

Dept. PS-31 THE CHILTON CO.,
56th & Chestnut Sts., Philadelphia 39, Pa.

Send books indicated for 10 DAYS FREE EXAMINATION. After 10 days, I will either remit the price indicated (plus postage) or return books promptly and owe nothing.

- ☐ GLENN'S NEW 1961 AUTO REPAIR MANUAL, Price $7.95
- ☐ Chilton's ENGINE REBUILDING & MAINTENANCE, $7.95
- ☐ Chilton's POWER ACCESSORIES MANUAL, Price $7.95
- ☐ Chilton's AUTO ELECTRICAL SYSTEM MANUAL, $7.95

SAVE! Send cash with order and Chilton pays postage and handling charge. Money refunded if you return books in 10 days.

NAME .....

ADDRESS .....

CITY, ZONE, STATE .....

Outside U.S.A.—Add $1.00 to price of each book. Cash with order. 10 day Money-Back Guarantee.



Copyrighted material

# Fish Grab My Hook Without Caution ...Attack so ravenously...

# I CATCH FISH LIKE CRAZY!

## My Secret is My French Patented Lure That's GUARANTEED TO CATCH FISH ... *or it costs you nothing.*

**BY EMILE PLANES**

**(AS TOLD TO PAUL STAG)**

Here is how I catch more fish than I ever caught in my life before. . . . More fish than I ever dreamed of — and BIGGER fish than I ever suspected possible. Here is how you can catch bass, pike, perch, bream, trout, salmon, crapple, pickerel, walleyes and many, many other kinds of fresh water game and pan fish plus many salt water fish . . . the same way I do.

Since I invented my fishing lure, I catch so many fish, such BIG fish, and catch them so FAST, people gather to watch me. I've been followed FOUR TIMES in ONE day by a fish warden to find out if my methods are legal. But my entire secret is my fishing lure that's GUARANTEED to CATCH FISH — or it costs you nothing. Yes, GUARANTEED to catch fish even when other lures or even live bait fails or no cost.

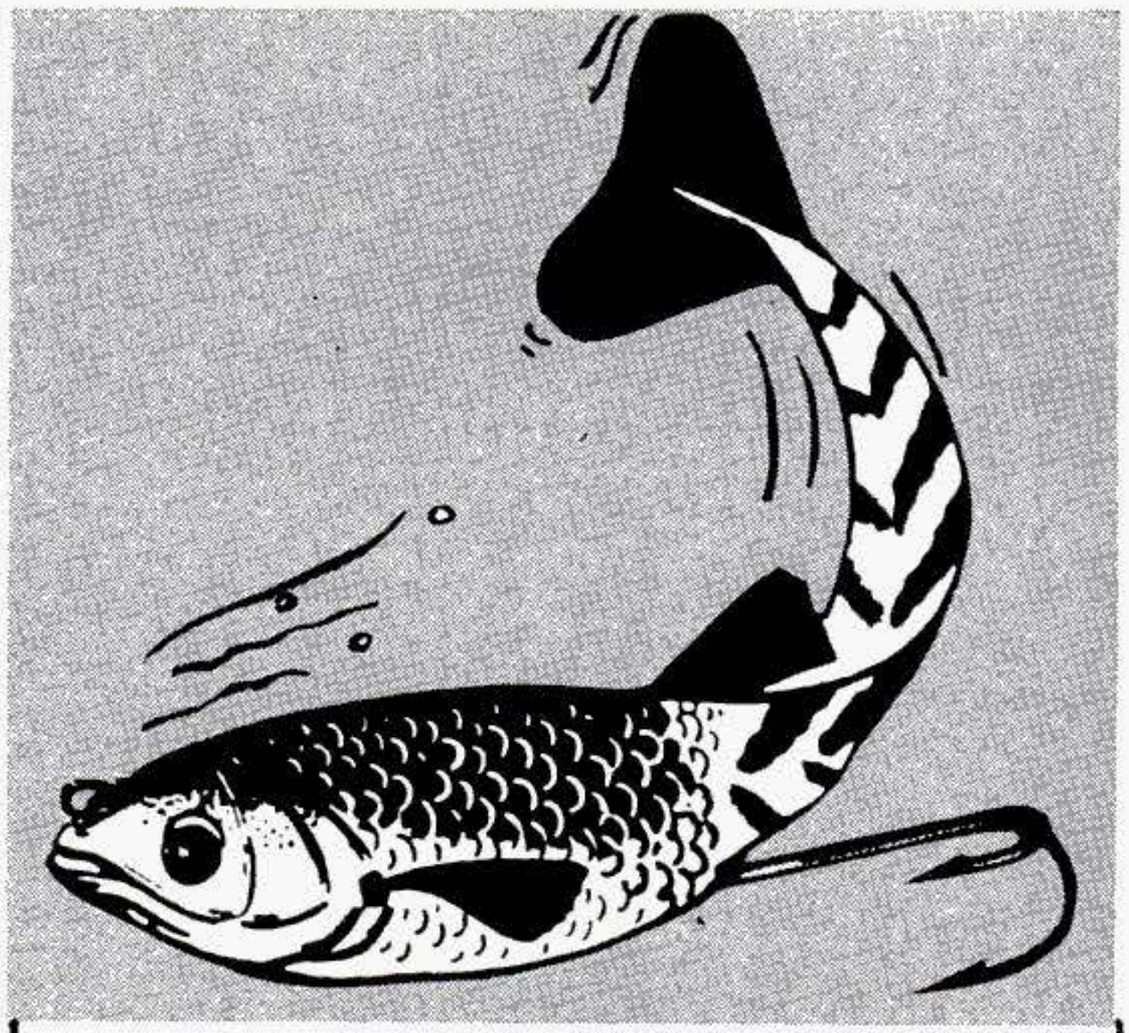
My lure works in lakes, ponds, streams, salt water, saves you time, work, money and disappointment, is ideal for amateurs, experts, trollers, casters, shore fishermen. My lure catches fish differently from anything you've ever seen before in fresh and salt water. Even veteran U. S. fishing guides have been surprised at its astonishing catches. And the French Government itself has certified my lure by actual patent as UNIQUE!

### An Underwater Discovery

I am a Frenchman, a science teacher, a skin diver and I have fished all my life. For years I have studied fish underwater — WHILE FISHERMEN ABOVE WATER were trying to catch them. What I discovered changed every idea I ever had about fishing and fishing lures.

### Lures Can Frighten Fish Away

I watched UNDERWATER exactly how fish reacted to every lure, live bait, every fishing maneuver and trick used to catch them. I watched fish approach even the best performing lures, seem ABOUT TO STRIKE — then suddenly TURN AWAY. Something about even the best performing lures was obviously often KEEPING THEM FROM CATCHING fish. As for the average lure, mostly they seemed actually to BORE the fish — as though they looked to the fish as they looked to me UNDERWATER — shiny, painted bits of metal, plastic and wood. I saw live bait after it was cast turn white and die before my eyes — and saw fish often approach, prepare to strike — THEN TURN AWAY



### HOW VIVIF WORKS!

Fish have never seen anything like this lure before. It attracts fish by its vibrating tail. It is the world's most life-like lure in the water. Fish can't resist it . . . and when they grab the lure it "feels" lifelike — doesn't warn them to spit it out before you can sink the hook in! Read this article and learn the amazing story of this imported lure.

### Minnows Irresistible

Then I saw the same fish approach actual live swimming minnows and without caution or suspicion STRIKE RAVENOUSLY. I saw the same fish that rejected the lures again and again attack without caution LIVE SWIMMING MINNOWS. In fact, these little minnows seemed to DRAW many fish from a distance—even before being seen.

### Why Lures Often Fail

My talks with fish scientists and my own studies convinced me it was the swimming motion of minnows, particularly the swishing tail that attracted many fish. I concluded that no lure I had ever used had SUFFICIENTLY duplicated the living minnow and its motion.

How, I asked myself, could a fish lure be created that would attract fish just as the actual living swimming minnows did — and that once attracted would get the same ravenous STRIKE as live minnows — WITHOUT the hesitation, suspicion and FEAR aroused by the lures I saw used?

## My Man-Made "Minnow"

After 19 years of study and testing, I have finally created such a man-made "minnow," so like a living, swimming minnow in shape, form, texture and motion that fish ravenously STRIKE — without caution — and I catch more fish, bigger fish — and faster than ever before in my life.

Because my man-made "fish" looks, darts, wiggles, even "feels" like a minnow . . . bass, pickerel, pike, perch, trout and many other kinds of fresh and salt water fish attack voraciously — without suspicion or fear — even when they're not biting for another fisherman on the lake.

## Astonishing Catches Reported

I call my lure VIVIF. Once I perfected VIVIF I started selling them to other fishermen. Soon news of astonishing catches came in — first France — then from other countries.

Yes, from all over comes reports of amazing catches — of fish biting where other lures failed — of the sureness, the simplicity, the effectiveness of this VIVIF lure. And what does this mean to you?

Simply this. Now YOU can get more out of fishing than ever before. Now YOU can catch more fish, bigger fish than ever in your life. It is GUARANTEED — or you pay not one penny. It means now no longer need you come back with an empty creel from a long day's fishing. It means no longer need you spend hours of work digging worms and catching minnows or other bait. It means you can save the endless expense of continually buying expensive spinners, flies, plugs, bait and lures. It means you can often catch the fish that are not biting on worms, bugs, plugs, spoons, canned bait, flies, cut bait or spinners or no cost. It means you can troll, cast, or shore fish with my lure with equal success. It means you can go out after and come back with large mouth bass, small mouth bass, pike, pickerel perch, bream, trout, walleyes, salmon, red tuna, striped bass, blue fish, weak fish and do it time and again — or your money will be refunded at any time. VIVIF is catching fish in 25 countries for delighted fishermen. 1,050,000 VIVIF's have been grabbed up. Already reports from U. S. fishermen say VIVIF is the greatest lure they have ever used. I predict VIVIF will soon be the world's fastest selling fish lure. But test the magic power of VIVIF yourself without risking a penny.

## VIVIF IS IMPORTED SUPPLIES are LIMITED

**To get your VIVIF now, mail Amazing Trial Coupon. U. S. supplies are still limited. Order now to be sure you'll have your VIVIF in time for your next fishing trip. Only if you act at once can we guarantee to fill your order immediately. Don't delay.**

## AMAZING TRIAL OFFER

It took me 19 years of hard work developing, improving, and perfecting VIVIF to achieve my final result. But you can test the magic power of VIVIF yourself without risking a penny. VIVIF takes the luck out of fishing, lets you have more fun out of fishing — because you catch more fish.

All you do is mail amazing no-risk trial coupon. When you receive your VIVIF, use it anywhere you like . . . to prove its fantastic fish catching powers. Use it to catch bass, trout, perch, pickerel, pike, walleyes . . . any sport or pan fish you like to catch.

Put VIVIF to every test. If you don't agree it is the finest lure you've ever used . . . if it doesn't catch more fish and bigger fish, you have used it entirely free. It won't cost you a penny.

THIS IS EMILE PLANES, Science Instructor, Skin Diver, ardent fisherman from Beauce, France, who went underwater to find out why fish reject certain lures and chase others . . . and who, as a result of years of observation, research, and development, finally ceated a true-to-life man-made minnow that practically no fish can resist . . . that holds an all-time Char Trout record in Britain, and has made amazing catches in this country and all over the world. Read on this page how you can try this amazing minnow that's GUARANTEED TO CATCH FISH OR IT COSTS YOU NOTHING! Read amazing trial offer below.

## Mail Amazing Trial Coupon Today

Harrison Home Products Corp., Dept. 33-PS
Fishing Tackle Division
8 Kingsland Avenue, Harrison, New Jersey

Please send VIVIF's checked below on AMAZING TRIAL OFFER. If VIVIF does not catch more fish . . . bigger fish . . . and make fishing more fun . . . if VIVIF is not the greatest lure I've ever used you will refund my money immediately including postage.

| Quan. | Weight | Color Comb | Model | Price |
|---|---|---|---|---|
| .....2¼" | ⅙ oz. | Green-Silver-Red | V-1 | @ $1.35 |
| .....2¼" | ⅙ oz. | Black and Gold | V-2 | @ $1.35 |
| .....2¼" | ⅙ oz. | Green-Gold-Red | V-3 | @ $1.35 |
| .....2¼" | ⅙ oz. | Red and White | V-4 | @ $1.35 |
| ALL 4 THIS SIZE FOR $4.95 | | | | |
| ..... 3" | ⅓ oz. | Brown-Silver-Red | V-51 | @ $1.65 |
| ..... 3" | ⅓ oz. | Black-Silver-Red | V-52 | @ $1.65 |
| ..... 3" | ⅓ oz. | Green-Gold-Red | V-53 | @ $1.65 |
| ..... 3" | ⅓ oz. | Red and White | V-54 | @ $1.65 |
| ALL 4 THIS SIZE FOR $5.95 | | | | |
| .....5½" | 2½ oz. | Green and Yellow | V-101 | @ $2.49 |
| ..... 5½" | 2½ oz. | Red and White | V-102 | @ $2.49 |
| .....5½" | 2½ oz. | Blue and Silver | V-105 | @ $2.49 |
| ALL 3 THIS SIZE FOR $6.95 | | | | |

☐ **PAYMENT ENCLOSED.** Send VIVIF's Postpaid! I save all C.O.D. Charges. (Money Back Guaranteed on all VIVIF's.)

☐ **SEND C.O.D.** I will pay postman price of VIVIF's plus C.O.D. postage. (Money Back Guarantee on all VIVIF's.)

NAME .....

ADDRESS .....

CITY .....ZONE..... STATE.....

**SPECIAL OFFER** ☐ **ONE OF EACH SIZE VIVIF LURES ALL FOR ONLY $4.95**

CANADIAN CUSTOMERS: Order from Harrison Tackle Company, 539 King St. W., Toronto, Ontario.



Copyrighted material

# FREE! LAFAYETTE

ELECTRONICS
324-PAGE 1961
CATALOG 610

From the world's leading supplier of electronics and stereo hi-fi equipment

HUNDREDS OF EXCLUSIVE LAFAYETTE FINE-QUALITY ITEMS AVAILABLE IN THIS CATALOG ONLY

The biggest, best and most comprehensive catalog in our history, featuring "The Best Buys in the Business." Thousands of items at the lowest money-saving prices.

SATISFACTION GUARANTEED OR MONEY REFUNDED

FOR ELECTRONICS SCIENCE & TECHNOLOGY

The "complete shopping center" for the audiophile, technician, engineer, student, hobbyist, serviceman and dealer. Exclusive at Lafayette—Lafayette Kits: easily the best value for your money any day.

MAIL THE COUPON TODAY FOR YOUR FREE CATALOG

LAFAYETTE LOCATIONS

JAMAICA • BRONX • NEW YORK CITY
NEWARK • PLAINFIELD • PARAMUS • BOSTON

Lafayette Electronics Dept. KC-1
P.O. Box 190
Jamaica 31, N. Y.

Send me the FREE 324-pg. 1961 catalog 610.

Name.....

Address.....

City.....Zone.....State.....

# ELECTRONIC CAR STARTER

AMAZING DEVICE HELPS START WET OR COLD CAR ENGINES—INSTANTLY!

Save your battery, save gas, save time and save your temper with amazing Electronic Car Starter.

## HOW IT WORKS

At instant of starting, Electronic Car Starter automatically sends Five Times the normal amount of spark from your plugs insuring a positive start every time! Then, this amazing device disconnects itself automatically the instant the engine begins running. Absolutely guaranteed to never damage the plugs or distributor. Electronic Car Starter is simply and easily installed with just three quick connections. Operates on both 6 Volt and 12 Volt cars.

If you park your car in wet or wintry weather Electronic Car Starter is a "must" for you. And even if you have a heated garage, you frequently park your car on wet or cold parking lots, in the street or road, etc.

We guarantee Electronic Car Starter to meet every claim made in this ad and, as proof, offer to ship it on our examine-and-try-before-you-buy plan.

Electronic Car Starter comes complete—ready to install, instantly. Only $8.95

**SEND NO MONEY WITH ORDER—PAY POSTMAN NOTHING ON DELIVERY**

Try it for 10 days before you buy. If completely satisfied send $3.00 and pay balance at the rate of $3 per month until the total price of $8.95 (plus small p.p. and budget charge) is paid. If not completely satisfied, return to us, no explanation necessary.

ACCURATE INSTRUMENT CO., INC.
Dept. D117, 911 Falle St., New York 59, N. Y.
Please rush one Electronic Car Starter. If satisfactory I will pay on the terms specified, otherwise I will return the Starter.

Name_____

Address_____

City_____Zone_____State_____

# Get Yourself FIXED FOR LIFE in the Big Pay Shoe Business!

It's no trick at all to make big money—FULL OR SPARE TIME—with the only shoe line featuring baby shoes in addition to shoes for all the family with new Family Discount plan. Lifetime security. Amazing new "Spring-Step" cushion invention proves it by actual demonstration. Only ORTHO-VENT has it! There is no other shoe in the world like it. Repeat orders are sure, steady. One try and a customer is sold for life. Profits are BIG. Orders are sure and easy with the most amazing 1-minute demonstration in the history of the shoe business. No experience needed. No investment to make. Everything, including actual cut-a-ways, furnished free! Be the big-pay ORTHO-VENT man in your territory. Write TODAY!

ORTHO-VENT SHOE COMPANY
413 BRAND RD. SALEM, VIRGINIA

WE GIVE PRODUCERS THEIR OWN SHOES AS A BONUS!

# "YOU ARE UNDER ARREST!"

Help Bring Crooks to Justice Through Scientific

## CRIME DETECTION!

We have taught thousands this exciting, profitable, pleasant profession. Let us teach you **in your own home.** Learn Finger Printing, Firearms Identification, Police Photography, Secret Service Methods thoroughly, quickly, at small cost. Over 800 of all American Bureaus of Identification employ I.A.S. students or graduates. Write for FREE "Blue Book of Crime."

*(A Correspondence School Since 1916)* State Age.

INSTITUTE OF APPLIED SCIENCE, 1920 Sunnyside Ave., Dept. 1363, Chicago 40, Ill.

# REAL ESTATE

BE A BROKER

PAY BIG! SEND FOR FREE, BIG, ILLUSTRATED CATALOG NOW! Graduates report making substantial incomes. Start and run your own business quickly. Men, women of all ages, learn easily. Course covers Sales, Property Management, Appraising, Loans, Mortgages, and related subjects. STUDY AT HOME or in classrooms in leading cities. Diploma awarded. Write TODAY for free book! No obligation.

FREE BOOK TELLS HOW

Approved for World War II and Korean Veterans

WEAVER SCHOOL OF REAL ESTATE (Est. 1936)
2020S Grand Ave. Kansas City, Mo.

# make your own Gems 36.50 F.O.B.

The Gem Maker comes complete with all necessary equipment, including a super-charged diamond blade for sawing, and all the wheels for grinding, shaping and polishing; also complete instructions. The complete equipment as shown, less motor and belt for only $36.50, f.o.b., Burlington, Wisconsin. Write today for information and literature.

B&I MANUFACTURING CO.
Dept. S, Burlington, Wis.

# Broken or Loose FALSE PLATE?

Make Plates Like New

## Fix it Yourself EASILY in a Few Minutes

Your plates may become broken or loose just when you need them most With FIX-IT-KIT you can repair your own broken plates Also tightens loose fitting plates, easily Get permanent comfort with professional material Complete instructions Satisfaction guaranteed or your money refunded. *Order Now* at a new low price only **$2.98** postpaid — or sent C.O D

DENT-FIX DENTAL PRODUCTS, Dept. 148, Box 674, Kansas City 41, Mo.

# Sharp Korium Steel! PIERCES METAL! 88¢

FAMOUS MONARCH

10" LONG FREE SHEATH

Internationally famous! Thick Korium steel blade, stilleto sharp! Even pierces some metals! Reindeer scene deep etched into blade! Giant size—10 inches overall. Bone handle topped with metal hawk head. Rugged service. Skin moose, rabbit, deer! Scale fish, cut hemp, wire, underbrush. Carve roasts, turkey. Forged by sword maker's proud of ancient craftsmanship. Comparative value $3.95.

Sold only by mail only by Famous Importer

THORESEN, Inc., Dept. 7-C-820
585 Water Street, New York 2, N. Y.

Now 88c plus 12c postage.

*Satisfaction Guaranteed or Money Back.*



Copyrighted material

Study Programs in...

# APPLIED SCIENCE AND ENGINEERING

**Associate in Applied Science degrees — 2 years**

Electronics Communications Technology
Electrical Power Technology
Computer Technology
Air Conditioning Technology
Industrial Technology
Metallurgical Technology

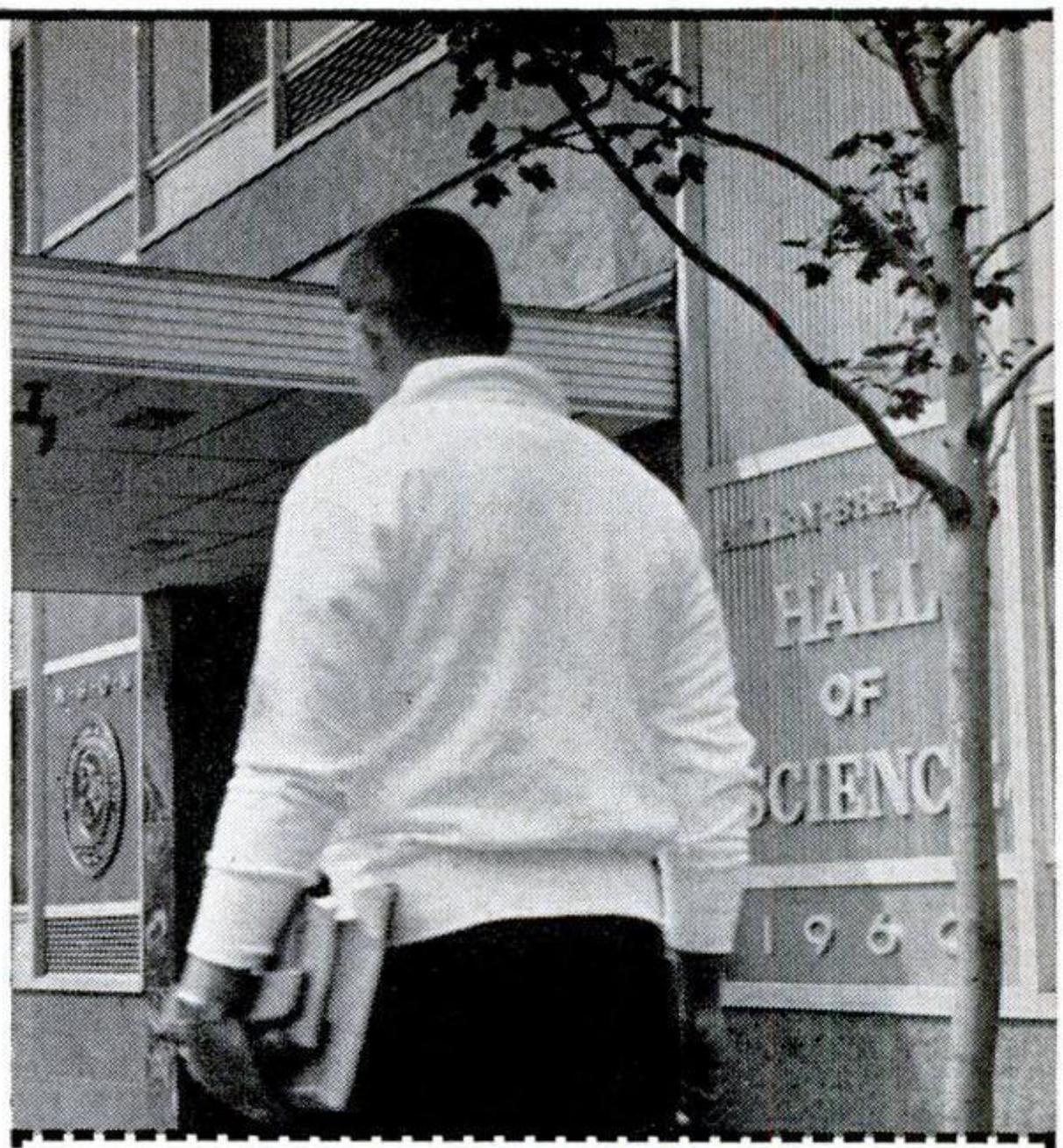
**Bachelor of Science degrees — 4 years**

Electrical Engineering
— Communications option
— Electrical power option
Mechanical Engineering

At MSOE, new classes begin quarterly. Pre-technology program, scholarships, financial aid, and placement service available.

New! FREE "Your Career" booklet. Send coupon today.

**MILWAUKEE SCHOOL OF ENGINEERING**
**1025 N. MILWAUKEE STREET • MILWAUKEE 1, WIS.**

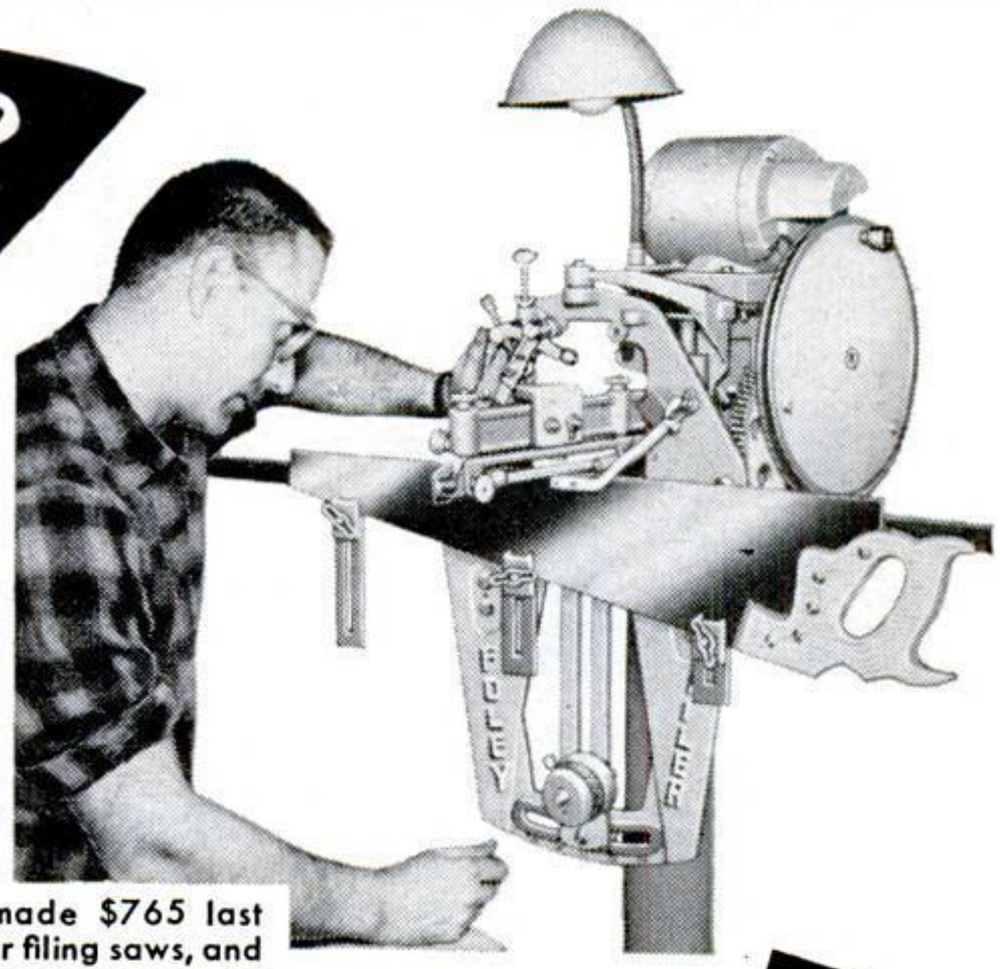



**MILWAUKEE SCHOOL OF ENGINEERING**
**Dept. PS-361, 1025 N. Milwaukee St., Milwaukee 1, Wis.**

Name..... Age.....
Address.....
City..... State.....
Course Interest.....
*(Please Print)*

# HERE'S A MONEYMAKER FOR YOU!

## make from $3 to $6 an hour with the FOLEY SAW FILER




Ask yourself these three questions: 1. Do I really want to get ahead *faster?* 2. How can I do it? 3. Am I willing to *use* my spare time? If you answer "Yes" to questions 1 and 3—then we have a positive answer for you on No. 2. Men make from $3 to $6 an hour sharpening hand, band and circular saws with Foley Saw Filers. No experience needed, to turn out sharp, smooth-cutting saws with this automatic machine. Start in spare time —no canvassing.

***HERE'S THE WAY TO START***

Read "Money Making Facts"—shows you how others have added hundreds or thousands of dollars to their incomes in this steady, repeat, CASH business. Start your *own* business in your basement or garage, no overhead, small investment. With *Time Payment Plan* the Foley can more than pay for itself out of profits. Send for "Money Making Facts"—mail coupon now. No salesman will call.

***HERE'S PROOF***

"When Mr. Patrick got his Foley Saw Filer in March 1946 he made a good and wonderful investment. He has done so well that we bought a house and paid for it; bought a new car, built an addition to our house. Nicest of all, it's all paid for." Mrs. Leslie Patrick.

"I made $765 last year filing saws, and it sure comes in handy. I do this work in my spare time." —James B. Williams

"Last year's profit amounted to $3,000. Not so bad for a one-man outfit."—Charles C. Hough.

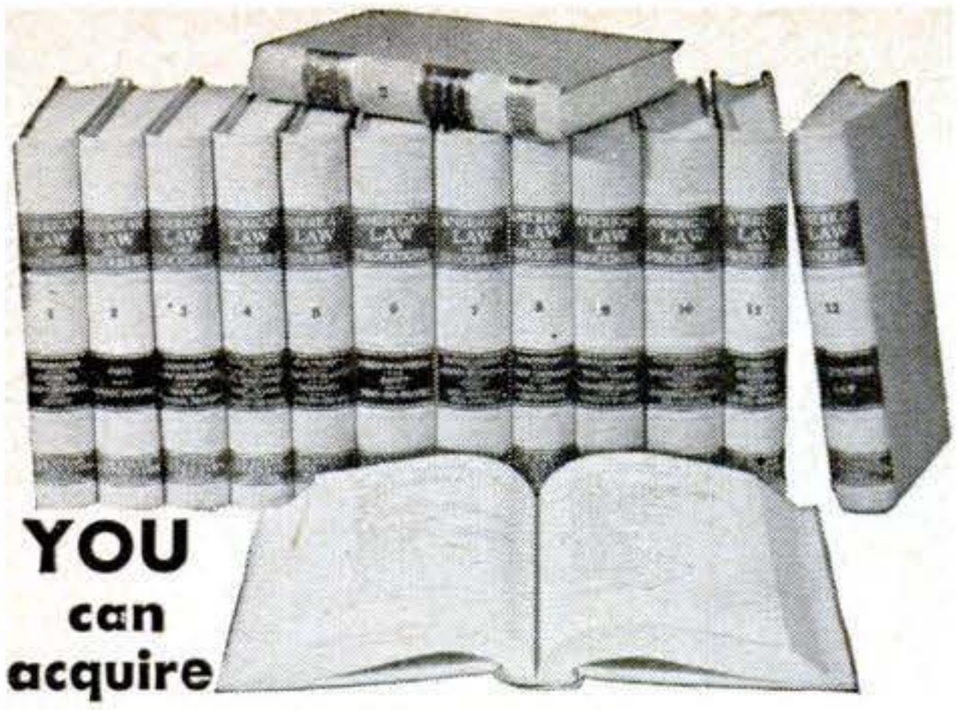
"I have done 4 or 5 thousand saws in my spare time in the 4½ years since I got the outfit, and they are all coming back with repeat orders." —Len Crego.

FOLEY MFG. CO., 319-1 Foley Bldg., Minneapolis 18, Minn.
Send me free book "MONEY MAKING FACTS" and Time Payment Plan.

NAME.....
ADDRESS.....




Copyrighted material



**YOU can acquire**

# LAW AT HOME! EARN LL. B. DEGREE

LaSalle's famous Law Library—used as reference in many Law libraries and Law offices—has enabled thousands to master Law surprisingly fast, in spare hours at home, for business and professional advancement.

These 14 remarkable volumes, compiled by leading professors and lawyers, cover the whole basic field of Law in condensed, orderly, simplified manner.

You advance rapidly with this great library, plus special lectures furnished. We guide you step-by-step with personalized Problem Method of instruction...you *learn by doing*—handling legal problems—not by memorizing rules.

Send for two FREE booklets, "Law Training for Leadership," and "Evidence," answering questions about Law and its value to you. Mail coupon below. No obligation.

*Accredited member, National Home Study Council*

**LA SALLE EXTENSION UNIVERSITY**
***A Correspondence Institution***

**417 S. Dearborn St. Dept. 383L Chicago 5, Ill.**

Send me your two FREE booklets described above, without obligation.

*Name*.....*Age*.....

*Street*.....

*City, Zone & State*.....

*You can make money in*

# WATCH REPAIR

## Learn at home the low cost Sweazey Way

**Watch repairing pays up to $6 an hour, part time watch makers report on survey. Unique and modern Sweazey home study System starts you making repairs right away on Swiss and American watches. Professionally prepared training. No previous experience needed. Special tools provided for practice. Tuition only $5 a month. Diploma Awarded. Free sample lesson and opportunity book give all facts. Write today. No obligation.**

**CHICAGO SCHOOL OF WATCHMAKING**
**2330 N. Milwaukee Avenue, Dept. 431, Chicago 47, Illinois**

**FREE BOOK and SAMPLE LESSON**

**CHICAGO SCHOOL OF WATCHMAKING**
**2330 N. Milwaukee Ave., Dept. 431, Chicago 47, Illinois**

Please rush FREE BOOK and Sample Home Study Lesson.

Name.....Age.....

Address.....

City.....Zone....State.....

# LIKE TO *Draw?*

**Learn at Home in Spare Time...**

No previous training or art ability needed. Learn to draw in weeks with "Famous System of Manual Training!" No tedious study. You get Big Bonus 15-piece Professional Kit with all equipment and materials you will need plus valuable "Magic Creator." **WIDE DEMAND for Commercial Artists-Cartoonists.** Unlimited earnings!! Many students start earning at once. Wonderful fun hobby, too. Send today for FREE Catalog. **Specify age.**

*FREE*

**CONTINENTAL SCHOOLS, INC.**
**Dept. PS-3 4201 S. Broadway, Los Angeles 37, Calif.**

# PLAY GUITAR IN 7 DAYS

**Or Your Money Back Guaranteed**

**SURPRISE FRIENDS, RELATIVES. ENJOY POPULARITY AND FUN GALORE!**

In this introductory offer you get TOP RADIO GUITARIST ED SALE'S famous 66 page secret system worth $3.00 which positively teaches you to play a beautiful song the first day and any song by ear or note in seven days! Contains 52 photos, 87 finger placing charts, etc. Shows how to tune, keep time, build chords, bass runs, dance chords, swing, etc., plus 110 popular and western songs, words and music; a $1.00 Chord Finder of all the chords used in popular music; a $3.00 Guitarist Book of Knowledge—**TOTAL VALUE $7.00—ALL THREE for only $2.98.** SEND NO MONEY! Just your name and address, pay postman $2.98 plus C.O.D. postage. (Or send $3.00 with order and I pay postage.) Same Money-back Guarantee. **ED SALE, Studio 154-B, Avon By the Sea, N. J.**

# GET INTO ELECTRONICS

V.T.I. training leads to success as technicians, field engineers, specialists in communications, guided missiles, computers, radar, automation. Basic & advanced courses in theory & laboratory. Assoc. degree in 29 mos. B.S. obtainable. ECPD accredited. G.I. approved. Graduates with major companies. Start Sept., Feb. Dorms, campus. H.S. graduate or equivalent. Catalog.

**VALPARAISO TECHNICAL INSTITUTE**
**DEPT. S VALPARAISO, INDIANA**

# SIGN PAINTING

***Home-Study Course—Only $5.95***

**Teaches you commercial sign painting and sign building as it is being done TODAY in leading shops all over the country. Complete practical course for self-instruction. Shows latest methods of truck lettering,** office doors, wood letters, reflecting signs, plastics, sprayed signs, gold leaf, silk screen process, up-to-date alphabets, money-making business information, etc.

**SATISFACTION GUARANTEED OR REFUND!** Contains all the instruction of a high-priced correspondence course. Full price, only $5.95, postpaid. Or C.O.D. plus postage. No risk—order today. Satisfaction or money back! Order "Sign Painting Course."

**NELSON-HALL CO., 210 S. Clinton St., Dept. 2CN-1, Chicago 6, Ill.**

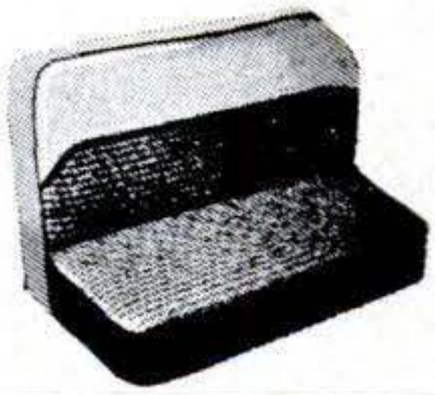
# MANUFACTURERS CLOSE OUT *SALE*

**CONV. TOPS**—Were $79.50—$24.95. While they last—State 2nd color choice, yr. and car. 25% with order. Balance C.O.D. or send check. Postpaid.

**TONNEAU COVERS** (sports cars only)—all colors. Plastic Leather.
Were $39.95—Sale $9.95
Aluminum zip'r $1.95 ex.

**AUTO SEAT COVERS**—American cars were $34.00, Sale $13.95 complete set

**Foreign cars**
Sale $15.95 complete set



**RITE FIT AUTO COVERS** 2334 1st Avenue, New York 35, N.Y.



Copyrighted material

# 17-Jewel Watches Sent to You Direct from Europe *from* $9.50 plus duty

**De Luxe Calendar Watch only $13.50 plus duty**

**EXPENSIVE STYLING, ANTIMAGNETIC SHOCKPROOF, WATERPROOF †**

Work with precision accuracy under even most rugged conditions; yet so handsome you'll be proud to show them off. Electronically tested, shatter-proof crystal, unbreakable mainspring, stainless steel back. Items starred also have luminous dial, raised numerals, expansion bracelet. Built by a European manufacturer famous since 1880. Comparable to U.S. watches costing more than twice as much.

**MAN'S WATCH #17**
only $9.50
plus duty

**WOMAN'S WATCH #17W**
only $12.50
plus duty

**CALENDAR WATCH #17CS**
only $13.50
plus duty

- * **#17** (pictured)—Chrome case, small second hand. **Only $ 9.50**
- * **#17S**—Identical to #17 with sweep second hand. **Only $11.50**
- * **#17CS** (pictured)—Deluxe model. Includes exclusive calendar window on dial. Date changes automatically. **Only $13.50**
- * **#17WG**—Woman's watch, all features at top. **Only $13.50**
- **#17W** (pictured)—Woman's watch, chrome or rolled gold. Deer-skin bracelet. **Only $12.50**

†Waterproof if case and crystal closed. Starred watches only.

Order today. Send coupon—with low price. Watches shipped directly from Europe to you. NO C.O.D.'s. When postman delivers package pay duty (about $3.80), which we are not allowed by post office to pay for you.

**CROWN JEWEL WATCH CO., Dept. 13, 175 Fifth Avenue, New York 10, N. Y.**

**2 YEAR GUARANTEE**

**CROWN JEWEL WATCH CO., Dept. 13,**
**175 Fifth Avenue, New York 10, N. Y.**

Please send me from Europe the following watches. Payment is enclosed. I will pay duty on delivery. Money-Back Guarantee.

☐ #17 @ $9.50 each ☐ #17S @ $11.50 each
☐ #17CS @ $13.50 each ☐ #17W @ $12.50 each
☐ #17WG @ $13.50 each
(all prices include Federal Tax)

Name .....

Address .....

City ..... Zone ..... State .....

---

# FREE GIANT 1961 204 PAGE CATALOG

**B-A 1961** ANNUAL CATALOG 611

SINCE 1927

Guarantee

- SAVE UP TO 50% ON B-A SELECTED KITS
- HI-FI AND STEREO SYSTEMS & COMPONENTS
- TOP VALUES IN POWER AND HAND TOOLS
- 30 PAGES OF BARGAINS NOT IN ANY OTHER CATALOG

*A Complete Buying Guide for Everything in*

**RADIO TV ELECTRONICS**

**BURSTEIN-APPLEBEE CO.**

**Dept. PS, 1012 McGee St., Kansas City 6, Mo.**

☐ Send Free 1961 B-A Catalog No. 611

Name .....

Address .....

City ..... State .....

**SEND FOR IT TODAY**

---

## *The BIG opportunities are now in*

# AIR CONDITIONING AND REFRIGERATION

Want a better job, big pay and a secure future? Be a mechanic in Air Conditioning & Refrigeration—America's finest opportunity field! During the past 12 years, production increased 400%—*no industry did better!* Each year over 8 million domestic and commercial units are sold. Already 150 million are in use. The industry needs 20,000 newly-trained mechanics annually!

*Train at home* for a top-pay job or your own business. The CTI method is easy, practical and result-ful. Learn by practicing with 25 kits of tools and parts. *Earn money spare time.* For full information, mail coupon today. *Commercial Trades Institute* (a non-profit organization), *Chicago 26, Illinois.*

***You train at home with real equipment***

***25 Kits!***

YOU BUILD THIS ¼ H. P. HEAVY DUTY CONDENSING UNIT!

**COMMERCIAL TRADES INSTITUTE, Dept. R-880**
**1400 Greenleaf Avenue, Chicago 26, Ill.**

Send booklet, *Success in Air Conditioning & Refrigeration,* and *Lesson Samples.* Both FREE.

Name _____ Age ____

Address _____

City _____ Zone ____ State ____

*Accredited by National Home Study Council*



Copyrighted material

Sworn statement from CHAS. LEMMING reads:

# "After starting my own business

# I've averaged $100 A DAY —most of it clear profit!"

• *If you want to be independent—free from layoffs, bosses—start profitable, year 'round business of your own.* **Ours is NOT a lease proposition.** *You own the machine, you work when and where you please, and all the money you take in is your own.* **FREE** *book tells you how.*

**• MAIL COUPON TODAY FOR FREE BOOK**

**VON SCHRADER MFG. CO.**
**311 "D" Pl., Racine, Wisconsin**

Without obligation rush your **FREE** booklet about how I can start my own permanent, profitable electric Upholstery Cleaning business.

Name_____

Address_____

City_____ Zone____ State_____

*Not everyone does as well...*
***Mr. Lemming owns two machines***

In city of less than 50,000, Mr. Lemming started his own business after filling in coupon like one below. He averaged $100 a day during first year, some days $200. F. E. Doran grossed $1050 in single month. Geo. Held grossed $300 in one week.

How much you earn depends largely on you. No special skill, no large investment required for our electric upholstery cleaning machine. Start spare time until full time justified. Hire helpers as needed.

**NO SHOP NECESSARY** • You clean upholstered furniture on customers' premises—homes, hotels, motels, etc. Auto upholstering, too. No hauling; operate from your home. Watch business grow as satisfied customers tell friends. Supplies cost little, profits high.

---

# ...TURN CONCRETE INTO GOLD!

MOTOR DRIVEN

R. L. T. of New York City reports: "MY GENERAL BLOCK MACHINE PAID FOR ITSELF IN FIRST 2 WEEKS!" Hundreds now in use the world over! Write for FREE details today!

## MAKE UP TO $75 A DAY IN YOUR OWN BUSINESS

If you want to have your own business — to start a business on your own — here's your big opportunity! New high speed, low cost General block machine produces up to 1,000 concrete blocks a day. Sell all you make to builders, supply houses, and others for homes, factories, buildings, garages. Cash in on the building boom! You can make profits of 100% to 150% — up to $75. a day! General block machine equipped with ½ h.p. electric motor — or can be supplied with gasoline engine — works anywhere, in little space, indoors or out. Operates from ordinary house light socket. Simple, foolproof 3 step operation — so easy a child can do it. Makes superior 3 core blocks any size from 4" to 12". Also makes chimney, sash, corner and other types. Blocks meet any building code anywhere in the country. Materials — sand, water, cement, available anywhere. Simple illustrated operating instructions and mixing formulae for cement and cinder blocks supplied with each machine. Write for FREE folder with full information.

**EXTRA** *Amazing illustrated book gives floor plans for 6 sensational concrete block bungalows. Tells how to lay blocks, lay out building lines, mix concrete, build steps, porch and concrete floors all at great savings. Written by experts. Can save many times the cost of the machine! Get it now! No strings attached. Send $1.*

BOOK SENT FREE IF YOU BUY MACHINE.
$1 REFUNDED IF YOU BUY LATER.

**GENERAL ENGINES CO.**
**DEPT. S-31 ROUTE 130, THOROFARE, N. J.**

---

# RUPTURED

## BE *FREE* FROM TRUSS SLAVERY

Surely you want to THROW AWAY TRUSSES FOREVER, be rid of Rupture Worries. Then Why Do you put up with wearing a griping, chafing and unsanitary truss the balance of your life? If you do, it will NOT be through necessity but through choice on your part.

Now there is a new modern **Non-Surgical** treatment that is designed to permanently correct rupture. These **Non-Surgical** treatments are so certain, that a Lifetime Certificate of Assurance is given. Write today for our New FREE Book that gives facts that may save you painful, expensive surgery. Tells **how non-surgically** you may again work, live, play, love and enjoy life in the manner you desire. There is no obligation.

**Excelsior Medical Clinic, Dept. H6224, Excelsior Springs, Mo.**

---

fastest, easiest way to learn math for self-improvement

# BASIC MATHEMATICS

(a 'picture-book' course) by Norman H. Crowhurst

New 'learn-by-pictures' course makes it easier than you ever dreamed possible to learn math—or return for full refund within 30 days of purchase!

4-Volume 'picture-book' course takes you step-by-step in easy stages from counting thru algebra, geometry, trigonometry to calculus. Now available —Vol. I, Arithmetic as an Outgrowth of Learning to Count (soft cover) $3.90. Vol. II, Introducing Algebra, Geometry, Trigonometry, Calculus as Ways of Thinking in Mathematics (available June).

Buy it from your bookseller, or write Dept. PS for FREE illustrated booklet

**JOHN F. RIDER PUBLISHER, INC.**
116 W. 14th St., N. Y. 11, N. Y.



Copyrighted material

# twenty to one dividend . . .

that's the reward you can receive from a college education in engineering or business. *Employers like Tri-State graduates* . . . interview seniors on campus. Qualify faster. *Bachelor of Science Degree in 27 months* in Electrical (Electronics or Power major), Mechanical, Aeronautical, Chemical, Civil Engineering. IN 36 MONTHS a B.S. in Business Administration (General Business, Accounting, Motor Transport Management majors). For earnest, capable students. Small classes. More professional class hours. Modernized buildings, well-equipped labs, new dorms. *Modest costs.* Year-round operation. Enter June, September, January, March. Founded 1884. *Write J. F. McCarthy, Director of Admissions for Catalog and "Your Career" Book.*

**TRI-STATE COLLEGE**

531 College Avenue Angola, Indiana

---

# TELEPHONE

# HANDSETS

Use as inter-house phone, talk house to garage, as loud speaker system, etc. You receive transmitter, receiver, 3 conductor cord and simplified, illustrated installation diagrams. Handsets are guaranteed to be the same as used in our great National Telephone System. Price delivered $2.95. **Two for $5.00!**

**TELEPHONE REPAIR AND SUPPLY CO.**

Dept. PS-612 1760 Lunt Ave., Chicago 26

---

# Catalog of 2900 Novelties 10c

New

Send 10c for amazing catalog of novelties, live animals, scientific supplies, hobbies, funmakers, planes & boats, looms, magic tricks, joke articles, unusual seeds, gadget timesavers, cameras, optical goods, projectors, movies, lucky jewelry, religious novelties, disguises, musical instruments, stamps, coins, puzzles, fortune tellers, radios, auto & bike accessories, telescopes, magnifiers, compasses, banks, smokers' gadgets, artists' supplies, printing sets, engines, motors, shockers, knives, billfolds, fireworks, guns, rifles, sports, books, games, plants, etc. Send name, address & 10c to:

JOHNSON SMITH & CO., Dept. 486 Detroit 7, Michigan

---

**18 FT. CRUISER KIT**

FREE CATALOG

With one-piece, ventilated fiberglas cabin.

**MASS PRODUCTION** MAKES THESE PRICES POSSIBLE

EASY TERMS

FROM **$520** Freight Prepaid

**TAFT MARINE WOODCRAFT**

Dept. PS-361, 636 39th Ave. N.E., Minneapolis 21, Minn.

---

# CHORD ORGANS SAVE UP TO ½

**Importer-to-You Prices**

**5 Day FREE Home Trial**

Startling value and performance! Buy direct from importer—amazing savings. Hand-crafted in Italy. Anyone can play. E-Z Terms. Bonus Gifts. Free Home Trial. Money Back Guarantee. Piano-keyboard models. New! Send for color catalogs, low discount prices.

FREE Color Catalog Rush Coupon

**PHILHARMONIC ORGAN CORP., Dept. P-31**
**2003 W. Chicago Ave., Chicago 22, Illinois**

Rush color Catalogs and Discount Price List.

NAME .....

ADDRESS .....

CITY & ZONE ..... STATE .....

---

motorists who appreciate quality

ask for... **KENDALL MOTOR OILS**

## To protect their investment

The superior quality of Kendall Dual Action or Kendall SuperB Motor Oil will keep your engine operating smoother and quieter. The same quality protection assures less wear, less need of repair — and millions of motorists have proved it.

**REFINED FROM THE CREAM OF PENNSYLVANIA CRUDE OIL**

*Kendall Refining Company*
*Bradford, Penna.*

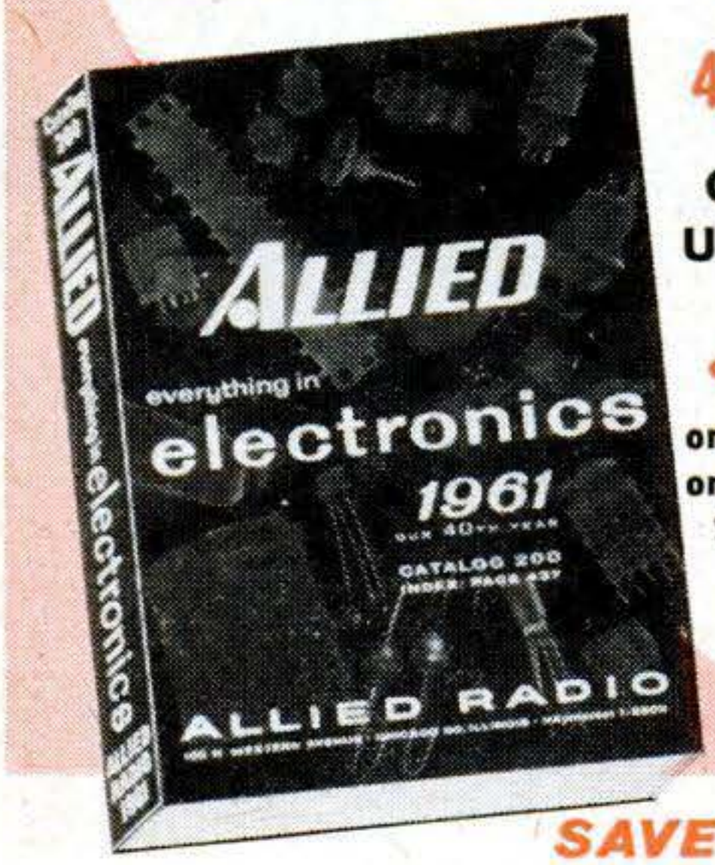


Copyrighted material

free

# ALLIED

## MONEY-SAVING 1961 ELECTRONICS CATALOG




444 PAGES

COMPLETE UP-TO-DATE

only $2 down

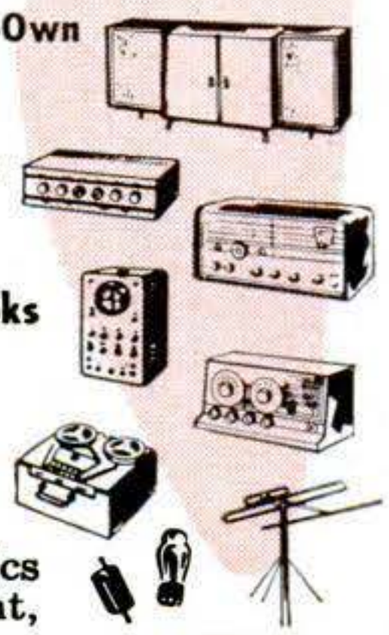
on orders up to $50; only $5 down up to $200; $10 down over $200

SAVE MOST ON

## EVERYTHING IN ELECTRONICS

Send for this leading, value-packed catalog featuring everything in Electronics, including products available only from ALLIED. Whether you're a kit builder, experimenter, hi-fi fan, Amateur, serviceman or engineer, you'll save most on:

- KNIGHT-KITS®—Best in Build-Your-Own
- Everything in Stereo High-Fidelity
- KNIGHT® Super-Value Stereo Hi-Fi
- Tape Recorders & Phono Equipment
- TV Tubes, Antennas, Accessories
- Parts, Tubes, Transistors
- Everything in Tools & Technical Books
- Amateur Station Equipment
- Citizen's Band 2-Way Radio
- Public Address & Paging Systems
- Latest Test & Lab Instruments



SAVE on everything in Electronics at ALLIED—get fastest shipment, expert personal help, easiest-pay terms, satisfaction guaranteed or your money back. Send coupon for FREE 1961 ALLIED Catalog.

SEND FOR FREE CATALOG

YOU CAN DEPEND ON THE WORLD'S LARGEST ELECTRONIC SUPPLY HOUSE

our 40th year

## ALLIED RADIO

ALLIED RADIO, Dept. 7-C1
100 N. Western Ave., Chicago 80, Ill.

☐ Rush FREE 1961 Allied Catalog No. 200

Name _____
PLEASE PRINT

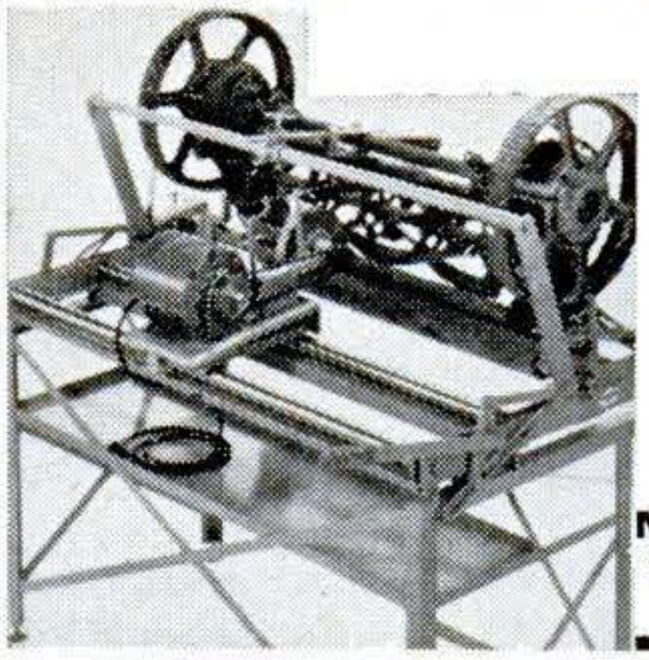
Address _____

City _____ Zone _____ State _____



## MAKE EXTRA CASH

SHARPENING LAWN MOWERS THE MODERN WAY



**Start your own shop! Full or spare time.** Earn many dollars in a short time . . . average $5.00 per hour. Many mowers need sharpening. With MODERN'S Extra Heavy Duty LAWN MOWER SHARPENER AND BED KNIFE GRINDER you have 6 machines in one. All operations are done quickly and easily. You make money from the start. Write for free details.

**MODERN MFG. CO.**
160 N. Fair Oaks Ave. Dept. 11-6
Pasadena, California



## PROFIT IN YOUR SPARE TIME

*FIX SMALL GASOLINE ENGINES*
Outboard • Powermower • Chain Saw • Tractor
*MAKE EXTRA MONEY*—or, repair your engines and SAVE. Illustrated, easy-to-understand, Home Study Course. FREE information. Write TODAY!

**LINCOLN TECHNICAL INSTITUTE**
Suite 3-G, 472 Market Street, Newark 5, New Jersey



## MEN WANTED

Earn $125 Per Week and up
AUTO DIESEL MECHANICS

Master a trade with a future — learn Auto-Diesel mechanics in our shops. You learn with tools on real equipment. Earn while you learn. Many of our graduates earn **$125** per week and up. No previous experience necessary. Day and night courses. Approved for veterans.

Write for free bulletin
AUTO-DIESEL COLLEGE
226 7th Ave., N., Dept. 41
Nashville 3, Tenn.



## Secrets of VENTRILOQUISM Now Revealed!

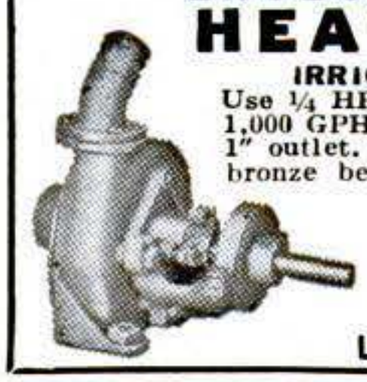
Easy to learn in 60 to 90 days with our Home Study Course. **RESULTS GUARANTEED.** Make Money! Be Popular! Have Fun! Big Opportunity! Radio, Television, Stage Appearances! For Free Information regarding price and terms, WRITE. You must state your age. Dummy Catalog 25c.

**MAHER HOME COURSE OF VENTRILOQUISM**
Box 36, Studio PS-3, Kensington Station
Detroit 24, Michigan



EXCLUSIVE DOUBLE-BEARING

## HEAVY DUTY PUMPS



**IRRIGATE • DRAIN • CIRCULATE • SPRAY**

Use ¼ HP motor or larger . . . 1 HP for up to 5,200 GPH; 1,000 GPH 60′ high; or 3,000 GPH from 25′ well. 1¼″ inlet; 1″ outlet. Stainless shaft. **TYPE X**—2 oil-less bronze bearings. Won't rust..... **$10.95**

**TYPE XB**—Ball bearing model. Best for belt drives..... **$12.95**

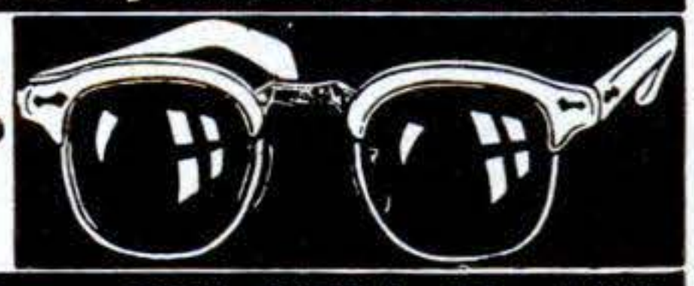
*Postpaid if cash with order.*
*Don't delay—send for yours today!*
**MONEY BACK GUARANTEE**
**Centrifugal and Gear Pumps in All Sizes**
**LABAWCO PUMPS, Belle Mead 4, N. J.**



## EYE GLASSES by MAIL As low as $1.95

WRITE for FREE CATALOG with 14 LENS SAMPLE CARD

*Thousands of Customers Est. 1939*



QUALITY READING — or BIFOCAL GLASSES for FAR and NEAR
**Recommended for folks approximately 40 years or older who do not have astigmatism or disease of the eye, and who have difficulty reading or seeing far.**
ADVANCE SPECTACLE CO. Inc., Dept. PS
537 So. DEARBORN ST. CHICAGO 5, ILLINOIS




Copyrighted material

# NEW RUBBER STAMP BUSINESS PAYS BEGINNERS UP TO $9.20 AN HR.

## START AT HOME IN SPARE TIME with Table Top Machine!

### We Help Finance You

The multi-million dollar Rubber Stamp business—once controlled by a few big companies—is now being taken over by small operators—one in each community throughout the United States. Men and Women who have this inexpensive machine can turn out huge quantities of Rubber Stamps with special wording that buyers once were forced to buy from big cities. Material costing only 27c makes a stamp that sells for $1.80. The machine that does the work is simple and easy to operate and it turns out as many as six Rubber Stamps at a time, each with different wording such as names, addresses, notices, stock numbers, prices and other "copy" needed by offices, factories and individuals. Working full capacity, it can earn as much as **$9.20 an hour for the operator!** Now you can get into the big-pay business yourself, with your own home as headquarters. You don't need experience. We supply everything, including complete instructions and eight ways to get business coming in fast. **We even help finance your start.** Start making up to $9.20 an hour from the very beginning. Cash in on the profitable Rubber Stamp business in your community, right away. We'll mail full particulars FREE and no salesman will call. Be first in your locality. Rush coupon today or send your name on postcard to:

**RUBBER STAMP DIV., Dept. R-3-C**
**1512 JARVIS AVENUE • CHICAGO 26, ILLINOIS**

**RUBBER STAMP DIV.**
**1512 Jarvis Ave., Dept. R-3-C**
**Chicago 26, Illinois**

**FREE!**

Please rush full particulars about your financing plan and the little machine that can get me started in the profitable Rubber Stamp business at home in spare time. Everything you send me is FREE and no salesman will call.

NAME _____

ADDRESS _____

CITY _____ ZONE ____ STATE _____

## FREE! 53 ORIENTALS

Send today for this **Spectacular Oriental Collection! More than 50** fabulous genuine postage stamps from Taiwan, Korea, Viet Nam, Japan, Singapore, Burma, Pakistan, Indonesia, Thailand, Hong Kong, Laos, many other strange, remote lands of the mysterious Far East. Sensational stamps picturing weird beasts, birds, ancient ships, queens, kings, beautiful women. **Extra! Big Bargain Catalog,** exciting offers and other thrilling stamps for your free examination. Send 10c for mailing expense — **Double your money back if not delighted!**

**Jamestown Stamp Co. Dept. C31PS, Jamestown, New York**
RUSH my Free Collection of 53 Orientals & other offers.
**I enclose 10c for mailing costs.**
**PLEASE PRINT**

**Name** .....

**Address** .....
**City &**
**State** .....

## EARN $10,000 A YEAR

☐ **DIESEL** ☐ **ELECTRONICS**
☐ **AUTO** ☐ **AUTOMATION**

The average starting salary of students, completing our FCC License, Electronics Technician Course, and those completing our Diesel Automotive Training, is $4,300 per year.

After becoming familiar with the industry, their salary usually increases to $6,000 or $7,000 per year.

After they become senior technicians, or master mechanics, they can earn $8,000 to $10,000 per year.

When they become specialists, or a part of management . . . or start their own business . . . they can earn considerably more.

**RESIDENT SHOP TRAINING** is easier and costs less than you may think! We provide you with housing and part-time jobs while in school, plus free nation-wide placement service for graduates.

***Check subject above in which you are interested and mail for***

Your Future IN ELECTRONICS AND AUTOMATION

**FREE BOOKLET**

**BAILEY Technical Schools**
**Veteran Approved**
1626 S. Grand, Rm. 50, St. Louis 4, Mo.

Your Future in DIESEL and AUTO MECHANICS

Name _____ Age _____
Street _____
Town _____ Zone ____ State _____



Copyrighted material

# ACCORDION PRICES SMASHED!

## SAVE UP TO 1/2

**Off Retail Prices of Comparable Accordions**

**OVER 30 MODELS**

**for Students and Professionals**

***EASY TERMS!***

**NOW—Buy DIRECT at Importer-to-You Prices**

Save more than you ever dreamed possible! For only a small amount down . . . and the balance just pennies a day...you can own and play a famous make Italian Accordion! Choose from America's biggest, most exciting selection... over 30 models, standard or electronic. New features! Many colors! Newest styling! **Get 5-Day FREE playing trial in your home.** 100% satisfaction assured!

**FREE BONUS GIFTS**

Let us prove how much more you save ...how much more you get for your accordion dollar. Pay NO teacher or salesman commissions! **Generous trade-in allowance for your old accordion.** Free appraisal. MAIL COUPON for FREE Color Catalogs and low Importer-to-You Prices.

**5 DAY FREE TRIAL**

**ACCORDION CORPORATION of AMERICA - Dept. P-31**
**2003 West Chicago Ave., Chicago 22, Illinois**

**Color Catalog FREE** Rush Coupon NOW !

**Accordion Corporation of America, Dept. P-31**
**2003 W. Chicago Ave., Chicago 22, Ill.**
Rush color catalog and "Importer-to-You" prices.

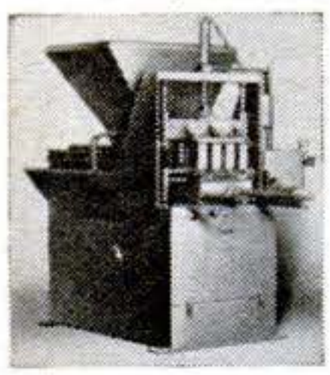
Name .....

Address .....

City ..... State .....

# Make Money with MULTICRETE

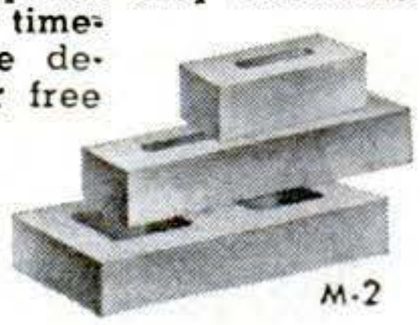
**Patio Stones Screen Block Brick, etc.**



Get into the garden masonry business — where manufacturing is easy, where the market is broad, and where income potentials are highly attractive.

Multicrete is a line of concrete masonry for building many things around house and garden — patios, walks, terraces, steps, barbecue pits, lattice walls, piers, planters, and many more. There's a place for Multicrete around almost every home.

The new Multicrete machine is compact and self-contained. Easy to operate because of hydraulic movements and automatic controls. Requires very little space. High production with low labor costs. Requires only moderate investment, with time-payments where desired. Write for free literature.



**W. E. DUNN MFG. CO.**
**402 W. 24th Street**
**HOLLAND, MICH.**

M-2

# Would YOU Like to Make $1,000 A MONTH?

***That's What Stanley Hyman Made Selling PRESTO***

**Amazing Midget Fire Extinguisher**

Stanley Hyman

Sensational! Presto does job of bulky extinguishers costing 4 times as much. Ends fires fast as 2 seconds; fits palm of hand. Never corrodes: guaranteed 20 years! Sells for only $4.95. Show it to owners of homes, cars, boats, farms, etc., and to stores for re-sale—make good income. Write for FREE Sales Kit.

**MERLITE INDUSTRIES, Presto Div.**
**114 East 32nd St. Dept. P-16C New York 16, N. Y.**
**In Canada: Mopa Co., Ltd., 371 Dowd St., Montreal 1, P. Q.**

# FREE

## MUSCLE BUILDING INFORMATION

*Sensational New Methods*

*Less Time—Less Effort—Better results*

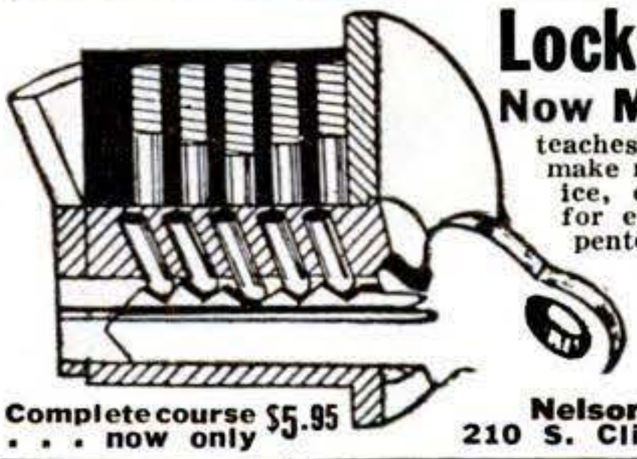
**BODY-TONE,** Box 638-E, North Miami 61, Fla.

# SOUND EFFECTS

## *Hi-Fi and Super*

Newest sounds: Airplanes, DC8, Electra Prop-Jet, Boeing 707, Air Force F-104 Starfighter, Regulus I, Missile Launching, Carrier Sounds. Also Autos, Music, Trains, Household and Industry. More than 13 classifications; over 1500 real-life sound effects. See your dealer or send 25c for 56-page catalog containing more than 250 record listings.

**MP-TV SERVICES, Inc., 7000-H Santa Monica Bl., Hollywood 38, Cal.**



# Locksmithing AND KEY MAKING

**Now Made Easy!** Practical up-to-date course teaches you how to pick locks, de-code, make master keys, repair, install, service, etc. New self-instruction lessons for every handyman, homeowner, carpenter, mechanic, service station operator, fix-it shop, hardware dealer, gunsmith. 53 easy illustrated lessons. Full price only $5.95, postpaid; or C.O.D. plus postage. Satisfaction or refund guaranteed.

Complete course $5.95 . . . now only

**Nelson-Hall Co., Dept. CN-1**
**210 S. Clinton St., Chicago 6, Ill.**

## DIAL TELEPHONE $8.95!

Gov't surplus-factory reconditioned. Standard type with coil cord, complete with wire, fully guaranteed. Add $2.00 if 4 prong plug is required. *Write for list. Shipments F.O.B.*

**SURPLUS SAVING CENTER**
**Waymart Dept. 3A1 Penna.**

## *DON'T DRAIN* YOUR ANTI-FREEZE

# NOW OR EVER!

NOW ANY PERMANENT ANTI-FREEZE CAN BE A *NEVER DRAIN* ALL SEASON COOLANT THAT LASTS FOR YEARS AND YEARS. Save many dollars on anti-freeze cost and service charges by using SL-9 ANTI-FREEZE REACTIVATOR. Keeps cooling system clean and efficient. Eliminates the need for rust inhibitors. One can of SL-9 is guaranteed to preserve your anti-freeze for 3-5 years or longer. FREE color-test anti-freeze tester included on limited offer. Get yours now and save! Money back guarantee. Both for only **$2** postpaid.

**SPEEDWAY LABORATORY-9**
**BOX 24125 INDIANAPOLIS 24, P.S., IND.**



Copyrighted material

# $1 BRINGS YOU $18

**Discover Flok-Kraft and Earn $$$$$ AT HOME**

Earn up to $15.00 per hour spare time. Amazing new Velvet-fiber spray instantly makes any object (Lamps, Radio & TV Cabinets, Figurines, Signs, Auto dash boards, toys, furniture, draperies—anything) worth expensive $$$$$ Prices . . . like magic, you can spray anything with this beautiful new suede-like finish that feels like rich Velvet.

**EARN UP TO $300.00 PER WEEK SPARE TIME**

Imagine, materials cost only 3c per square foot. (Average TV or radio cabinet can be beautifully sprayed with this startling new 3-dimensional Velvet finish in 15 minutes at a cost of only 34c in materials. Your charge for this job is at least $10.00.)

**REPRESENTATIVES IN YOUR AREA URGENTLY NEEDED**

Own your own business. Work at home in your spare time. Help fill the huge growing demand for this amazing new beautiful Velvet-fiber finish. Orders come from stores, offices, homes, architects, auto dealers.—everywhere. Possible $20,000,000.00 worth of jobs to be done. Investigate today—be first in your area!

Actual samples in 16 Radiant Colors, Booklet of 50 Home Business Opportunities and Confidential Details all sent free! Send no money. Write: **Coast Industries, Los Angeles 61, Calif., Dept. A-3.**

# BE A CLAIM INVESTIGATOR

**INVESTIGATE ACCIDENTS!**

**Many earning $750 to $1000 a month. Thousands of insurance companies, steamship lines and Government Offices need Claim Investigators. Also big opportunities for *your own spare time business*. We train you at home. National Placement Service FREE of extra charge. Bill King writes: "Your course has paid off for me with large earnings. You can quote me — your Adjuster Training Course is worth many times the cost." Write TODAY for FREE book.**

**UNIVERSAL SCHOOLS**

University Park, Dept. PS-3, Box 8202, Dallas 5, Texas

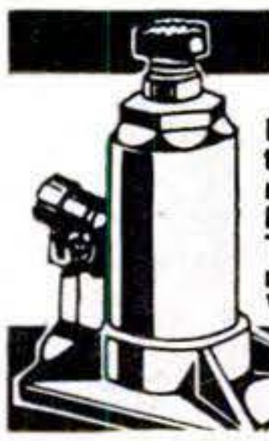
*Start Your Own* **HOME-IMPORT BUSINESS**

**FREE BOOK** SHOWS YOU HOW

**Cash in on big U. S. import craze.** Famous World Trader guides men, women to big profits on small imports. Get exciting imports at trifling cost abroad for full or spare time home business. No previous experience or product investment. Book, full details *free*. Write now. **Mellinger Co.,**

**1717 WESTWOOD, DEPT. T243, LOS ANGELES 24, CALIF.**

# HYDRAULIC JACK REPAIRS



**Earn While You Learn at Home**

**Millions of jacks in gas & auto-service stations, truckers, body-shops, riggers, factories, farms need servicing. We show you HOW—easy step by step directions—what tools to use. EARN UP TO $5 an hour, in spare time, in your own basement or garage. Start your own business NOW. Write for folder No. PS-3 & free bonus offer.**

**Institute of Hydraulic Jack Repair**
**P.O. Box 50, Bloomfield, N. J.**

# REMOTE CONTROL OIL DRAIN PLUG

*(Pat. Pending)*

Cable-operated from under hood. Install it yourself in minutes, without special tools.

**CHANGE YOUR OWN OIL.**

**SAVE $2** per change

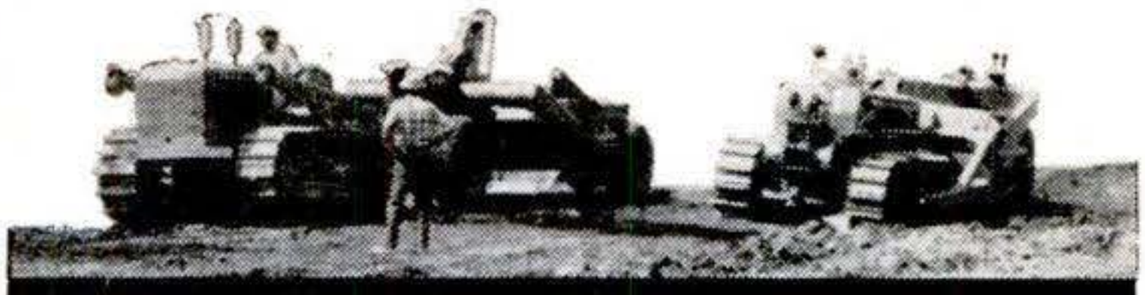
**• Convenient! No waiting at gas station! • No jacking; no crawling under car! • Just open hood, flick knob; out comes the oil! • Absolutely foolproof; 6 built-in safety features! • Perfect de-sludging—every time!**

**5-YEAR WRITTEN GUARANTEE**

Fits all cars except Hudson, Lark, Corvette, Corvair; fits most foreign cars too. Send $5.95, check or m.o., stating car make, year, no. of cyl. Detailed information on request.

**COSMOPOLITAN RESEARCH CORP.**

**Box 5791** **Detroit 39, Mich.**



# HIGH WAGES

**for operators of heavy construction equipment**

**. . . here's *your* opportunity to be a part of the biggest booming industry in the U. S. A. and earn up to $10,000 a year and more!**

*NOW* is the time for you to learn to be an Operating Engineer for big diesel-engined bulldozers, draglines, cranes, back hoes, scrapers and motorgraders! Get in on the ground floor of this great industry. Cash in on the training you'll get at National for years to come. The construction field is going up, up, up . . . heavy equipment operators today are making as much as $10,000 a year and more, and the really big boom years are still to come!

*You* can make a career out of it . . . and the best part of all is that you need no experience to start. National School trains you right from the beginning in the operation and maintenance of all types of earth-moving equipment.

**LEARN** on the largest and finest machines . . . machines of major manufacturers are used to train you.

**LEARN** from experienced teachers . . . expert operators with years of practical on-the-job experience are your instructors. Contractors are on our advisory staff.

**LEARN** by doing . . . the outdoors is your classroom and actual operating machines are your tools. National is NOT a correspondence school, but a fully equipped educational institution located in the beautiful Piedmont area of North Carolina where you will live while you learn!

**COMPARE NATIONAL'S ADVANTAGES!**

First school of its kind in the world . . . Full training courses (220-440 hours) . . . No home-study lessons . . . Over 30 earth-moving machines . . . Complete job advisory and counseling service, U. S. and overseas projects. Mail the coupon NOW . . . No salesman will call!

*Gilbert S. Shaw*
*President and Founder*

**Contractors need trained heavy equipment operators and pay high wages to our graduates. Begin TODAY to learn your way to better pay . . . mail the coupon NOW for FREE information. No obligation. Ages 18-55. Budget plan available. Approved for G.I. Benefits. Contractor affiliations.**

**NATIONAL SCHOOL of HEAVY EQUIPMENT OPERATION DEPT. A-15**
**P. O. Drawer 1686, Charlotte, N. C.**

Please send me FREE illustrated school catalog and complete information without obligation about how I can become an operator.

Name_____ Age_____

Address_____

City_____ Zone_____ State_____



Copyrighted material

# FIX ELECTRIC APPLIANCES

## PAYS $3 TO $5 AN HOUR

***Spare Time, Full Time • Learn at Home***

FREE BOOK offered below shows how YOU can now have a good-paying business of your own, right in your home. No experience needed, just simple tools. Learn to repair Electric Appliances. Pays $3-$5 an hour!

400 MILLION Appliances are in American homes right now. 76 Million MORE bought each year. People need them fixed, good times or bad. YOU make good money doing it. In your basement, garage, even on your kitchen table.

**FREE BOOK SHOWS HOW FREE LESSON STARTS YOU**

**QUICK WAY TO GET STARTED**

For less than 20¢ a day our easy, pictured instruction — backed by 45 years of success in home training — prepares you for top earnings in this booming field. Earl Reid of Thompson, Ohio says: "Made $510 in one month spare time. NRI course is priceless." At no extra charge you even get all parts for your own Appliance Tester, too. Finds trouble-spots, speeds and checks your work.

Get your FREE Book and FREE Sample Lesson! Mail coupon below, letter or postcard, *now*.

FREE BOOK

FREE LESSON

**NATIONAL RADIO INSTITUTE, Appliance Division**
**Dept. BC1, Washington 16, D.C.**

Send *Free* Book, *Free* Appliance Repair Course Lesson. Am interested in:

☐ Spare Time Earnings ☐ My Own Business ☐ Better Job

Name.....

Address.....

City.....Zone...State.....

Accredited Member National Home Study Council

---

# FREE Pro-Diving Catalog-Manual

Complete PRO-"lung" information for underwater fun, adventure, profit. **Spear fishing, treasure hunting, exploring, boat maintenance, salvage, life-saving, utility diving.** Tell-all instructions and tech-data by registered, licensed experts. New PRO-61 models, accessories. Save ⅓ or more with PRO "Factory-to-You" offer. Send for FREE Catalog-Manual now.

**ROSE AVIATION, Inc.**
**Box 33 Aurora, Ohio**

---

# LEARN PLASTICS

**COMPLETE LOW COST SHOP METHOD HOME TRAINING NOW AVAILABLE**

Get in on Big Money opportunities in Plastic molding, casting, forming, carving, etc. Earn as you learn with Interstate's professionally prepared course. All plastic materials furnished.

**WRITE FOR FREE BOOKLET**

**INTERSTATE TRAINING SERVICE**
**DEPT. C-2, PORTLAND 12, OREGON**

---

# LAW FREE BOOK

THE LAW TRAINED MAN

Write today for a FREE copy of illustrated law book, **"THE LAW-TRAINED MAN,"** which shows how to earn the professional Bachelor of Laws (LL.B.) degree through home study of the famous Blackstone Law Course. All necessary books and lessons provided. Moderate cost; convenient monthly terms. Write for FREE law training book today.

**Blackstone School of Law, 307 N. Michigan Ave.**
*Founded 1890* **Dept. 123, Chicago 1, Illinois.**

---

# FREE GERMAN STEEL HUNTING KNIFE

**4-INCH BLADE**

We give you handiest hunting and fishing knife you've ever had! Has 4-INCH LONG highly tempered steel blade—VERY SHARP! Attractive handle. We send knife FREE to acquaint you with our below-wholesale bargains. Please send 25¢ for handling. NO LIMIT—but send 25¢ handling for each knife. Order TODAY!

**HUNTING KNIFE, Dept. K-545, Box 881, St. Louis, Mo.**

---

# FREE GUIDE *Reveals 200 Ways to Make Extra Money*

YOU can turn your spare hours into cash ($25 to $100 a week)! Ask for *Free Subscription* to *Opportunity Magazine*, nationwide guide to extra cash for millions of men and women. Contains hints, plans, hundreds of offers. No matter what your age, experience, or occupation—write TODAY for next 5 issues FREE. Send no money—just your name.

**OPPORTUNITY, 850 N. Dearborn, Dept. 334 Chicago 10, Ill.**

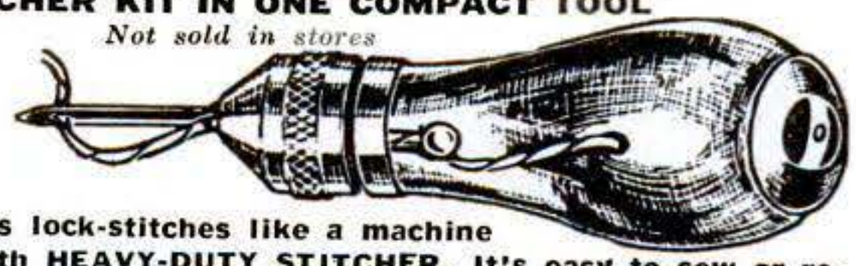
---

# SEW LEATHER AND TOUGH MATERIALS EASILY

**COMPLETE, EASY-TO-USE, HEAVY DUTY STITCHER KIT IN ONE COMPACT TOOL**

*Not sold in stores*

**$1.98** Postpaid



Makes lock-stitches like a machine

**SAVE MONEY with HEAVY-DUTY STITCHER.** It's easy to sew or repair anything made of Leather, Canvas, Nylon, Plastic, or other heavy materials. Quick "push pull" action makes firm, even lock-stitches like a machine. Gets into hard-to-get-at places. Just the tool needed for repairing Luggage, Footwear, Convertible Tops, Awnings, Seat Covers, Sportsgear, Rugs, Saddlery, etc. Comes complete with 3 different needles (fine, heavy, curved) and bobbin of strong waxed thread (10 yds) all self-contained in HEAVY-DUTY STITCHER. Easy-to-follow directions included. Extra needles and thread always available. Send $1.98 money order or check, and we pay postage. If C.O.D. $1.98 plus postal charges. Money back Guarantee.

**Sportsman's Post, 366 Madison Ave., Dept. A-54, New York 17**

---

# FOR INDUSTRY OR HOMECRAFT 8" TILT ARBOR SAW

***BUY DIRECT FROM FACTORY***

**BLADE TILTS • TABLE REMAINS LEVEL**

*Complete as shown less blade*

**NOW $99.5 FACTORY PRICE**

Heavy duty all cast iron and steel construction. Precision ground cast iron table. Price includes massive cast iron mitre gauge and patented motor drive that fits any motor. Does everything same as saws costing five times as much—cross cuts, rips, bevels, mitres, dadoes, cuts compound angles. Adjustable depth of cut; 0" to 2¼".

**SPECIAL BARGAIN**—This saw is our 1960 model. Brand new—sent to you in factory sealed cartons. Sold and guaranteed direct from factory to you at a fantastic bargain. This machine has features of machines costing many times more. 480,000 now out working—winning praise everywhere.

**MONEY-BACK GUARANTEE**

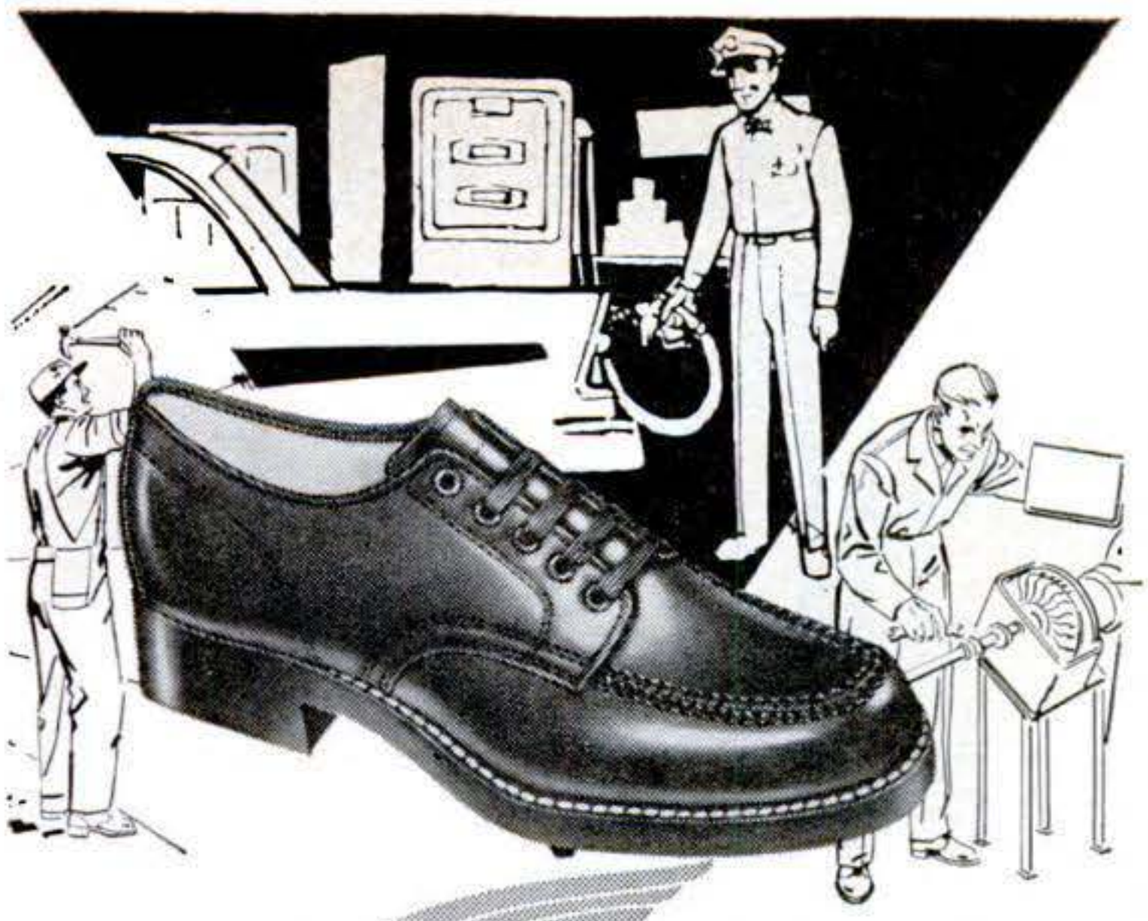
Try this famous saw 10 days. If not completely delighted —FOR ANY REASON—return for immediate refund.

**SENT EXPRESS COLLECT** Send check or M.O. $2.00 deposits on C.O.D.'s. We reserve right to refund money if stock is exhausted. Avoid diappointment. Order right now!

**AMERICAN MACHINE & TOOL CO.**
ROYERSFORD 64, PA.



Copyrighted material



# Wear RED WING SHOES OXFORDS

## *and feel fit!*

Enjoy new comfort. Know new pleasure from the moment you put them on. Red Wing Shoes—fit your work, fit you.

Illustrated #366 Cushion insole spring steel shank, neoprene sole and heel. Also available with **Safety Steel Toe** #363.

*At your nearest Red Wing Shoe dealer or write for his name*

**RED WING SHOE COMPANY**
195 Main Street Red Wing, Minnesota

# NEW FOR '61!

# *Simplicity*®

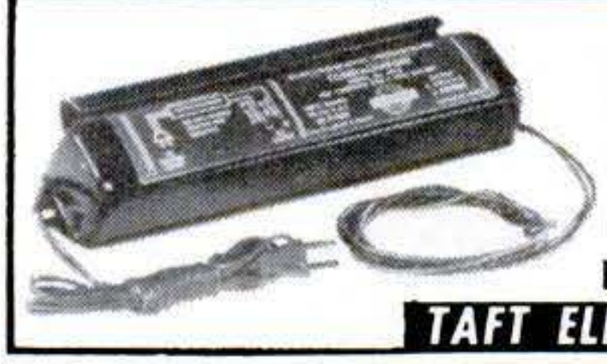
## 7 HP MODEL W

America's Biggest Garden Tractor Value! Exclusive C-T* Differential!

*Controlled-Traction provides superior traction on all surfaces. New 3-speed transmission. Simplicity quality means rugged frame, sturdy handle-bars and years of all-season work saving on mowing, plowing, tilling, hauling, snow removal, many other jobs! Write for *free* catalog!

SIMPLICITY MANUFACTURING CO.
6137 Spring Street • Port Washington, Wisconsin

# AT LAST! A PERMANENTLY INSTALLED BATTERY CHARGER



**INSTANT STARTS EVERY TIME! NEVER A DEAD BATTERY!**
- Permanently installed
- No moving parts
- Never any danger of overcharging
- Constant output charging rate from varying input line voltages
- Thoroughly insulated

THE
**'CONSTACHARGER'**
**$29.95** POSTPAID CASH, CHECK, M.O.
SPECIFY 6V OR 12V SIZE

**FREE OFFER! WITH EVERY ORDER! 20 FOOT REEL IN LINE CORD—A $9.95 VALUE**

*TAFT ELECTRONICS • 3020 TAFT STREET • DEPT. B-1 • HOLLYWOOD • FLORIDA*

# *LEARN MEAT CUTTING* AT NATIONAL

**Pay After Graduation**

The steady dependable trade of Meat Cutting taught easily in 8 short weeks. YOU LEARN BY DOING under actual meat market conditions in big modern school at Toledo.

For beginners or men with experience. Get a profitable store of your own. Remember PEOPLE MUST EAT! Big pay jobs. Free employment help. Thousands of successful graduates.

Buying, cutting, percentage, pricing, advertising, selling, etc. A complete retail meat education. National School established 38 years. Get National training NOW. Pay your tuition in easy weekly payments after you graduate. Send coupon for FREE school catalog—TODAY. G.I. approved.

National School of Meat Cutting, Inc.
Dept. 51-Q, Toledo 4, Ohio
Send me your FREE school catalog on National Training at Toledo in Meat Cutting, Meat Merchandising and Self Service Meats. No obligation. No salesman will call.

Name.....Age.....

Address.....

City.....State.....

Approved for Veterans


Copyrighted material

# ELECTRONICS

**Train in the new shop-labs of the world famous**

# COYNE
## ELECTRICAL SCHOOL

**on a quarter of a million dollars worth of equipment or learn at home in your spare time with Coyne's modern television training.**

Use this coupon to get our FREE BOOK
**"GUIDE TO CAREERS"**

**COYNE ELECTRICAL SCHOOL**
1501 W. Congress Pkwy.
Dept. of Electronics 51D, Chicago 7, Ill.

☐ training at Coyne ☐ training at home

NAME _____

ADDRESS _____

CITY _____ STATE _____

*Unlike most other schools, we do not employ salesmen.*

Hobby or service, you'll lick the "toughies" with this versatile new Heathkit Analyzer. Spots bad spark plugs, defective points, failing wiring, coil and condenser problems, incorrect dwell time, worn distributor parts, etc.

## Find ignition defects quickly with this new Heathkit Ignition Analyzer

- Switch-select primary, secondary, parade or superimposed patterns without lead switching
- New, improved trigger circuit for steady, locked-in patterns
- Vertical and horizontal "expand" for magnified views
- Usable for in-shop or on-the-road testing

HEATHKIT by DAYSTROM

Free Catalog

**HEATH COMPANY**
Benton Harbor 16, Michigan
Please send Free Heathkit Catalog.

NAME _____

ADDRESS _____

CITY _____ ZONE ____ STATE _____

See your local Heathkit Dealer or order direct by mail.

BETTER BUY

**U. S. SAVINGS BONDS**

for a BETTER FUTURE

## "$7,108.50 First Year SERVICING RADIATORS!"

NEW!

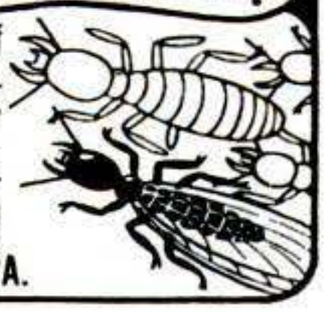
— Hank Konter, Newcastle, Wyo.

Make good money servicing auto-truck-tractor radiators with new Inland 1-Piece Radiator Shop. Easy to test, clean and repair radiators. Inland, world's largest radiator equipment mfgr., trains you free. Small down payment starts you. Proved merchandising assures volume. Profitable dept. for garage or service station. Write

**INLAND MFG. CO., Dept. PS-3, 1108 Jackson St., Omaha 2, Nebr.**

## TERMITES?

GET RID OF THEM YOURSELF!



Don't pay up to $300 and more to get rid of termites or prevent infestation. Do-it-yourself—Easily! Quickly! Inexpensively with "TERM-OUT" solution. Send 10¢ for fact-filled handbook.

**COMPASS RESEARCH**
701-B INVESTMENT BLDG., PITTSBURGH 22, PA.

## GOVERNMENT OIL LEASES LOW AS $1 PER ACRE.

You do no drilling, pay no taxes, may realize a king-size profit without ever leaving home. Write for free map and literature.

**AMERICAN OIL SCOUTS, Dept. PS**
8350 Santa Monica Blvd. Los Angeles 46, Calif.

## RECHARGEABLE BATTERY for TRANSISTOR RADIOS

***SAVES UP TO $96!***

**Recharges 100 times or more**

Replaces all 9-volt batteries such as Eveready 216, Burgess 2U6, RCA VS312, VS323, Mallary M1604, Rayovac 1604, Zenith Z216 or equivalents. **MONEY-BACK GUARANTEE.**

**$5.95 ppd.**
comp. with lifetime cordless charger

**ARTHUR SALES CO.**
Dept. P3, 216 W. 14 St., New York 11, N. Y.

## BLASTS MOLESTERS ...THUGS!

Amazing **TEAR GAS** PENCIL

**100% PROTECTION!**

**Discharges tear gas to instantly stop, stun and incapacitate the most vicious man or beast. Effective substitute for firearms; leaves no permanent injury. No selling experience needed. Handle as profitable sideline, soon you'll sell it full time. Start now! Send $5.95 for demonstration kit of Automatic Tear Gas Pencil, 10 demonstrators and 3 Tear Gas Cartridges. NOT SOLD TO MINORS, nor in Mich., Calif. or N. Y. State age with order.**

BIG PROFITS, SELLS EASY TO GAS STATIONS NIGHT WORKERS MOTORISTS, NURSES, STORES, BANKS, HOMES

**HAGEN SUPPLY CORP., Dept. P-31, St. Paul 1, Minn.**



Copyrighted material

✶ DRY SOFT
✶ STAY SOFT
✶ WEAR LONGER
✶ LEATHER

*where better work gloves are sold*

**WOLVERINE GLOVES**

---

Millions have done it so can YOU!

**Stop being SKINNY like I was**
**Quickly GAIN 25 LBS. of**
**HANDSOME, POWER-PACKED MUSCLES like I did**
Send for these 5 AMAZING PICTURE COURSES
All **5 FREE** before $1 price goes back

1. How to GAIN MIGHTY ARMS
2. How to GAIN A BIG CHEST
3. How to GAIN A MIGHTY BACK
4. How to GAIN POWERFUL LEGS
5. How to GAIN A GRIP OF STEEL

Send 10¢ for postage for all 6 items

Before

Also FREE Photo Book of Strong Men

**Jowett Institute, Dept. PS-130, Great Neck, New York**

---

# LEARN WHILE YOU SLEEP!

Hypnotize self, others while asleep with amazing hypnotic phonograph records, tapes. Free catalog lists 200 unusual records, tapes & equipment for sleep-learning & hypnosis experimenters. Sleep-Learning Research Ass'n., Box 24-Z Olympia, Washington.

---

**FREE CATALOG**

Send for FREE Wholesale Catalog.

**MAKE YOUR OWN RODS AND LURES**

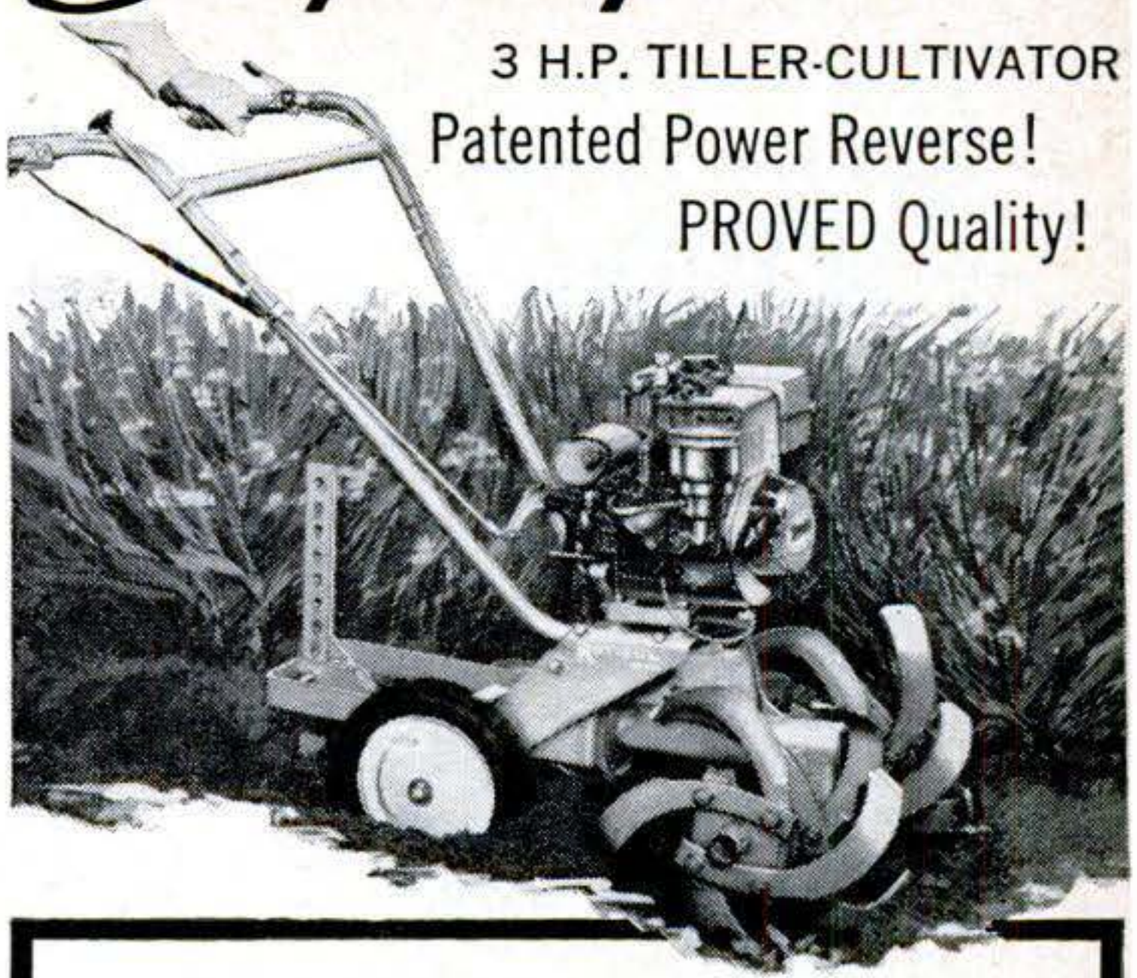
The most complete and fully illustrated catalog of reels, rods, beads, spinners, jigs, lure bodies and parts, sinker molds, feathers, tools, hooks, rod blanks, rod parts, swivels, wire, etc. Over 170 pages.

**FINNYSPORTS 2161X Sports Bldg. Toledo 14, Ohio**

---

# Simplicity® ROTICUL

3 H.P. TILLER-CULTIVATOR
Patented Power Reverse!
PROVED Quality!



No more "pull-back" strain!
Tills close to hedges, fences!

Full working visibility, finger-tip control, plenty of power for all tilling or cultivating — even heavy soils. Non-winding, self-sharpening tines guaranteed against breakage; adjustable tillage width — 8⅜" to 29". Scientific tilling action won't pulverize soil. When you buy, insist on Simplicity quality. Write for FREE catalog!

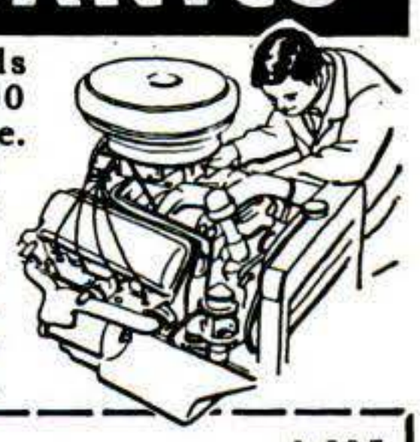
SIMPLICITY MANUFACTURING CO.
6137 Spring Street • Port Washington, Wis.

Maker of Simplicity Garden Tractors, Wonder Boy Riding Lawn Mowers, Simplicity '700' Riding Tractor

---

*Train at home for Big Money in*

# AUTO MECHANICS



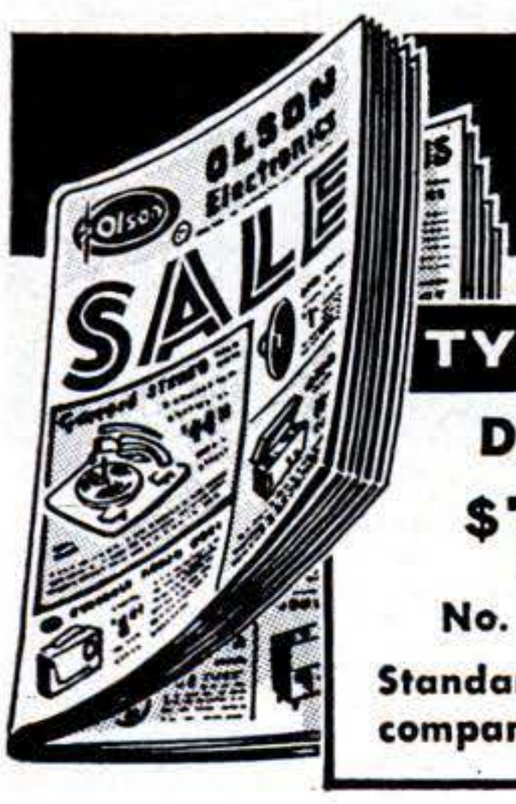
Experts say that "America needs 100,000 auto mechanics and 25,000 repair shops." Good jobs everywhere. Steady work. High pay plus opportunity to go in business. Train at home. *Earn money spare time as you learn.* Mechanic's tools and test instruments sent. Diesel or Body Rebuilding lessons included. Facts are free. *Be sure to mail coupon today.*

COMMERCIAL TRADES INSTITUTE A-115
1400 GREENLEAF AVE. • CHICAGO 26, ILL.

Name_____ Age_____
Address_____
City_____ Zone_____ State_____

---

**CUT OUT AND MAIL TODAY**




# 8 FREE BIG ISSUES OLSON CATALOGS

**TYPICAL VALUE**

**DIAL TELEPHONE**
**$7.93**
No. PH-31
Standard phone company model.

We will send you a new issue every 6 weeks for a full year – NO CHARGE! Compare our World Famous Values.

☐ SEND FREE CATALOGS

☐ Send Dial Telephone @ $7.93, plus postage

MAIL TO: **OLSON ELECTRONICS**
(Formerly Olson Radio)
518 S. Forge St., Akron 8, Ohio

NAME_____
ADDRESS_____
CITY_____ ZONE____ STATE_____



Copyrighted material

NOW...you, too, can have a car that

# LUBRICATES ITSELF *Automatically*

...for as little as $22.95*

## NEW WALKER FULLY AUTOMATIC LUBRICATION SYSTEM "GREASES" YOUR CAR EVERY TIME YOU START!

Forget about the bother and cost of "grease jobs" . . . keep your car riding and steering like new *always* . . . cut repairs . . . with a Walker full-time, automatic lubricator. Easy to install, fully guaranteed, pays for itself.

**WALKER** *PRICE RANGE—$22.95—$28.95—$36.95 . . . for information on your car MAIL COUPON TODAY!

**WALKER MFG. CO.**
Dept. P-361-S, Racine, Wis.

Send **FREE** . . . installation diagram and estimate on vehicle described here:

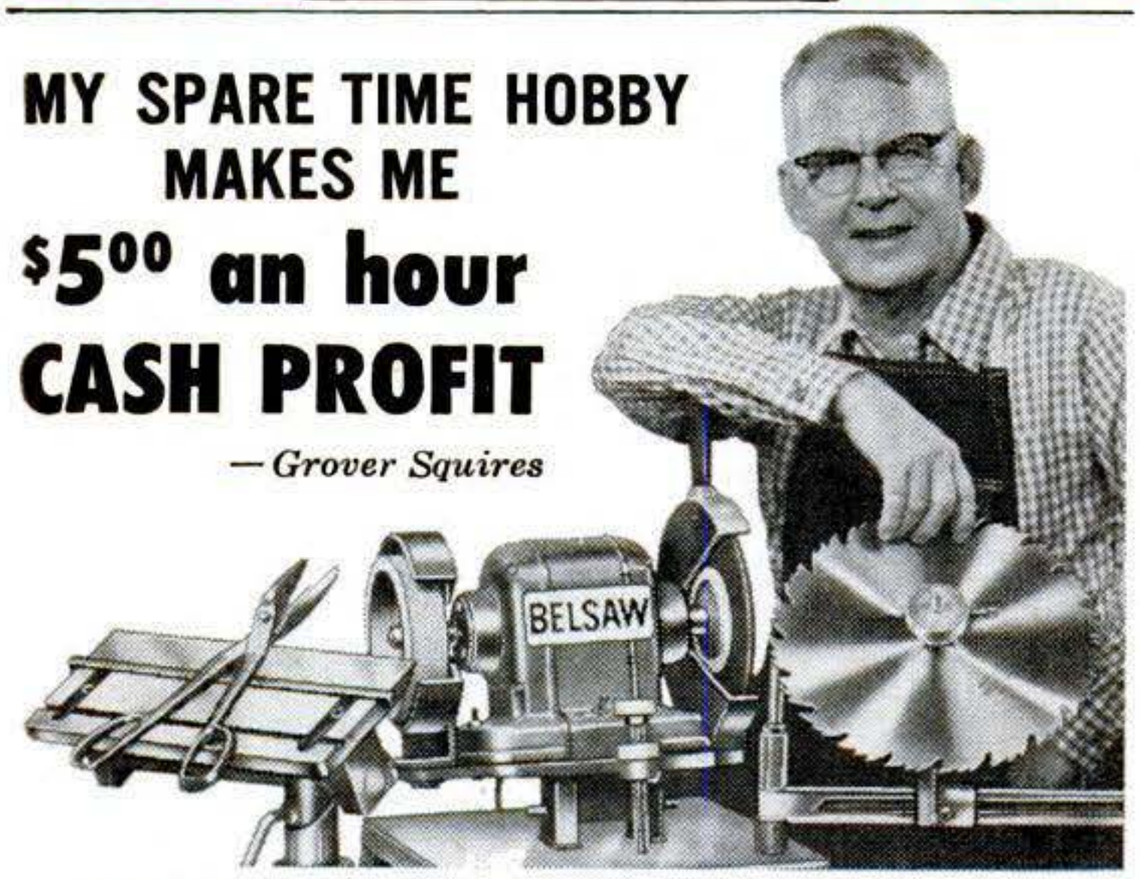
Make of vehicle.....Year.....
Automatic Transmission: Yes.....No.....
Power Steering: Yes.....No.....
Engine: 6 Cylinder.....8 Cylinder.....
NAME .....
ADDRESS .....
CITY .....STATE .....

DEALER INQUIRIES INVITED



# MY SPARE TIME HOBBY MAKES ME $5.00 an hour CASH PROFIT

*—Grover Squires*



## START YOUR OWN SPARE TIME BUSINESS

You can turn your spare time into Big Cash Profits with your own **COMPLETE SHARPENING SHOP** . . . Grind saws, knives, scissors, skates, lawn mower blades . . . all cutting edges. Your Own Cash Business with no inventory . . . right at home . . . no experience needed.

**FREE BOOK** tells how you can start your own spare time business while you are still working at your regular job. Low Cost — time payments only $15.00 a month. **Send coupon today.**

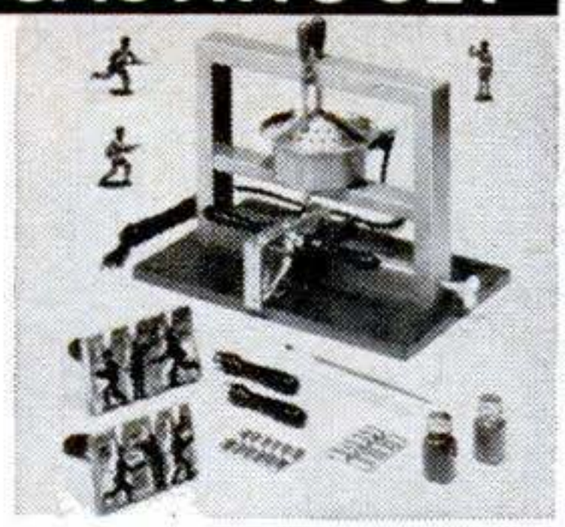
FREE BOOK

**BELSAW SHARP-ALL CO,** 701 Field Bldg., Kansas City 11, Mo.
Send Free Book "LIFETIME SECURITY". No obligation.
Name_____
Address_____
City_____State_____



*New!* **AUTOMATIC ELECTRIC METAL CASTING SET**

**Automatic Electric Casting Set as shown. No. 6040-PS, Postpaid Only $15.00.**
*Add $1.00 to orders west of Rockies, Canada and Mexico.*
**Electric Hand Casting Set Complete. No. 5710C-PS, Postpaid Only $10.00.**
*Add $1.00 to orders west of Rockies, Canada and Mexico.*
**Beginners' Non-Electric Casting Set. No. 5704-PS, Postpaid Only $5.00.**
*Add 50c to orders west of Rockies, Canada and Mexico.*
**3 Figure Molds. Only $3.00 each.**
**No. 6092—Confederate Soldiers.** *Bugler, Flag-Bearer, Officer charging.*
**No. 6093—Union Infantry** *Charging Officer, Bayoneter, Rifleman.*
**Casting Metal 36 Pigs (App. 1½ lbs.) Only $2.00.**



**MANY OTHER MOLDS AVAILABLE. FREE LIST WITH ORDER.**

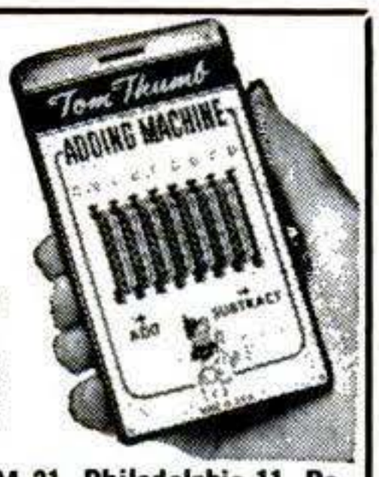
**HOME FOUNDRY MFG.**
**1826 S. Washtenaw Ave., Chicago 8, Ill.**



# ADDING MACHINE

$1.98 ea. or 2 for $3.69

+ − × ÷
**ADD—SUBTR.—MULT.—DIVIDE**




Does all 4 operations. Handles 9 columns of numbers. Settle for no less. Leatherette case. Lowest price adder made in America. Beware of cheapened foreign imitations. Money back guarantee. Agents wanted. **$1.98** add 4% tax in Pa.

**TOM THUMB** P. O. Box 5066, Dept. M-21, Philadelphia 11, Pa.



## *You Can Have a* HE-MAN VOICE

Send today for FREE booklet "Voice Power and Personal Power" by Eugene Feuchtinger. Just send your name, address and age. Mailed in plain sealed envelope. No obligation.

**PREFECT VOICE INSTITUTE**
210 S. Clinton St., Studio CN-1 Chicago 6, Ill.



Be a **LOCKSMITH!**
EARN WHILE YOU LEARN
Send for FREE BOOK

Big opportunities in this fascinating, profitable trade. Earn quickly—step into a well-paid job or start a business of your own, full or part time. Learn easily at home, all materials and special tools supplied. Vet. App'd. FREE book! Write:

**LOCKSMITHING INSTITUTE, Dept. 203-1, 150 Park Ave., E. Rutherford, N. J.**
Div. Technical Home Study Schools Lic. by State of N. J.



**NEW, NATURAL LIGHTWEIGHT DENTAL PLATE**

**MADE FROM YOUR OLD ONE**—New, Professional Method gives you natural-looking, perfect-fitting plastic plate—upper, lower or partial—from your old cracked or loose plate *without an impression*. CLINICAL method means fast service, huge savings. Try new plate full 30 days **at our risk.** New plates sent you Air Mail *same day.*

Now Priced Low As $15.95

**SEND NO MONEY**—just your name and address for full particulars FREE. No cost. No obligation. Act now.
**CLINICAL DENTAL LAB., 335 W. Madison St., Dept. F1153 Chicago 6, Ill.**



**NEW BENSEN GYRO-COPTER**

Plans and kits for one-man "Spirit of Kitty Hawk" now available. Easy to build and fly. 3-view drawings, specs, photo $2 or simpler Copter Glider $1. Order today!

**BENSEN AIRCRAFT CORP., Dept. PS-31**
**Raleigh-Durham Airport, Raleigh, N. C.**
NAME_____
ADDRESS_____




Copyrighted material

*Not everyone does as well, but T. N. CODY, who started a business of his own, reports...*

## For 12 months I've averaged

# $800 PER MONTH INCOME

## —most of it clear profit for me!

Many men have discovered how to be independent, to be free of layoffs and bosses. C. G. Naples grossed more than $200 his first week. A father-son combination grossed $44,000 their second year. H. Lemon says, "*I netted $133 in one 8-hour day.*"

How much you make depends largely on you. You need no special skill, no large investment. Start part time if you wish.

**NO SHOP NECESSARY** • Our Electric Deterger shampoos rugs, carpets right on floor—removes dirt and grime and helps to show their natural color and beauty. So efficient and safe it is used by largest railroads and hotels.

***This is not a lease proposition.*** *You own the machine, you work when and where you please and all the money you take in is your own. You take no risk. Machines fully guaranteed.*

**MAIL COUPON TODAY FOR FREE BOOK**

**VON SCHRADER MFG. CO.**
311 "R" Pl., Racine, Wisconsin

Without obligation send me **FREE** booklet about your RUG DETERGER and tell me how I can start *my own* permanent, profitable business.

Name_____

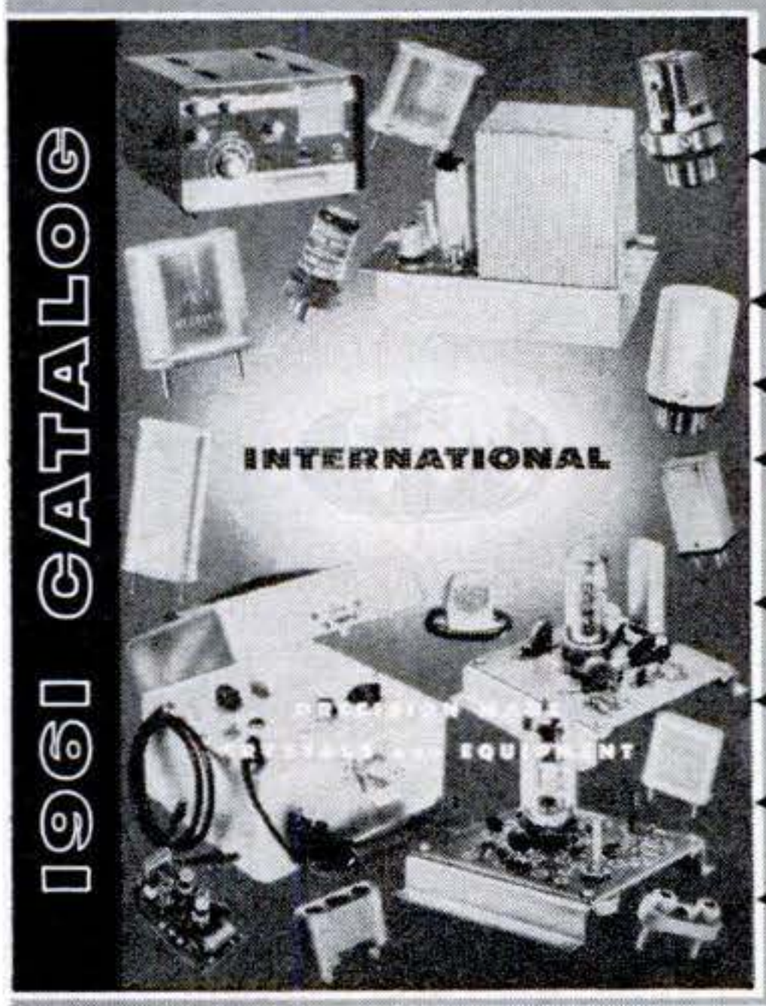
Address_____

City_____ Zone____ State_____

---

# FREE CATALOG

**INTERNATIONAL CRYSTAL MFG. CO.**
**18 NORTH LEE, OKLAHOMA CITY, OKLAHOMA**




- Commercial Crystals
- Amateur and Citizens Band Crystals
- Auto Radio Converters
- Oscillators
- Frequency Alignment Equipment
- Transmitters/ Modulators
- Transistor Subassemblies
- Citizens Band Transceivers
- Citizens Band Antennas and Accessories

**SEND FOR IT TODAY**

Send Free 1961 International Catalog

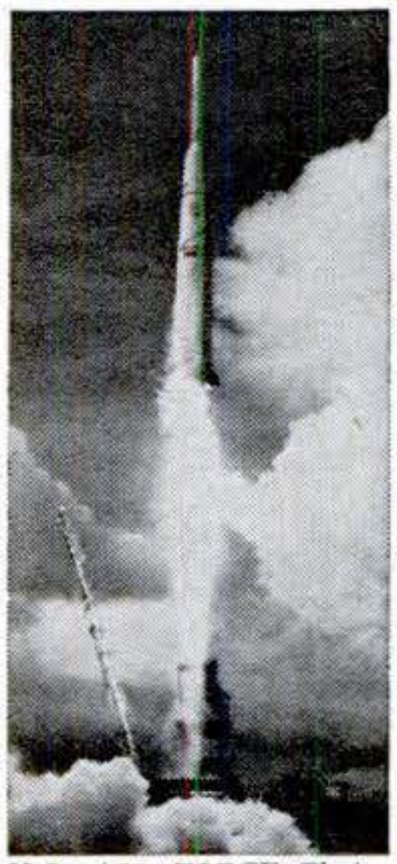
NAME .....

ADDRESS .....

CITY.....STATE.....

---

# ENGINEERING



U.S. AIR FORCE Photo. Missile headed for outer space. Courtesy of Space Technology Laboratories, Inc.

**Enroll Now for New Term**

*Heald College Ranks FIRST West of the Mississippi in "Who's Who in America"*

**Send for FREE information**

*Select any one of the 14 Modern Engineering Courses listed below. Any one of them will lead you to a Successful, Safe, and Secure Lifetime Career.*

## BACHELOR OF SCIENCE DEGREE, 30 MONTHS

**SAVE 2 YEARS' TIME**

**B.S. Degree Courses:**

- ☐ Electronic Engineering
- ☐ Electrical Engineering
- ☐ Highway Engineering
- ☐ Mechanical Engineering
- ☐ Structural Engineering
- ☐ Civil Engineering
- ☐ Architecture

**Diploma Courses:**

- ☐ RADIO-TELEVISION Plus Color TECHNICIAN
- ☐ Electronic Technician
- ☐ Industrial Electronic Tech.
- ☐ Die and Tool Design
- ☐ Architectural Drafting
- ☐ Mechanical Drafting
- ☐ Structural Drafting

***Approved for Veterans***

## HEALD Engineering College

**Van Ness at Post, Dept. PS-361** **San Francisco, California**

NAME_____

STREET_____

CITY_____

STATE_____



Copyrighted material

# MERCURY

**The most powerful name in outboards**

## grows stronger every year!

***Slamming over a log at full throttle*** is a brutal test of outboard stamina. Time after time, standard 45 hp Mercurys and other outboards were subjected to this "destruction test". Most competitive engines failed early — but Mercury outboards were going strong after dozens of jolts!

Mercury doesn't recommend this kind of outboarding, but every outboarder should be happy to know that Mercury motors thrive under treatment far rougher than they meet in normal boating use. The margin of durability built into Mercs demonstrates the advanced engineering and construction that put Mercury years ahead!

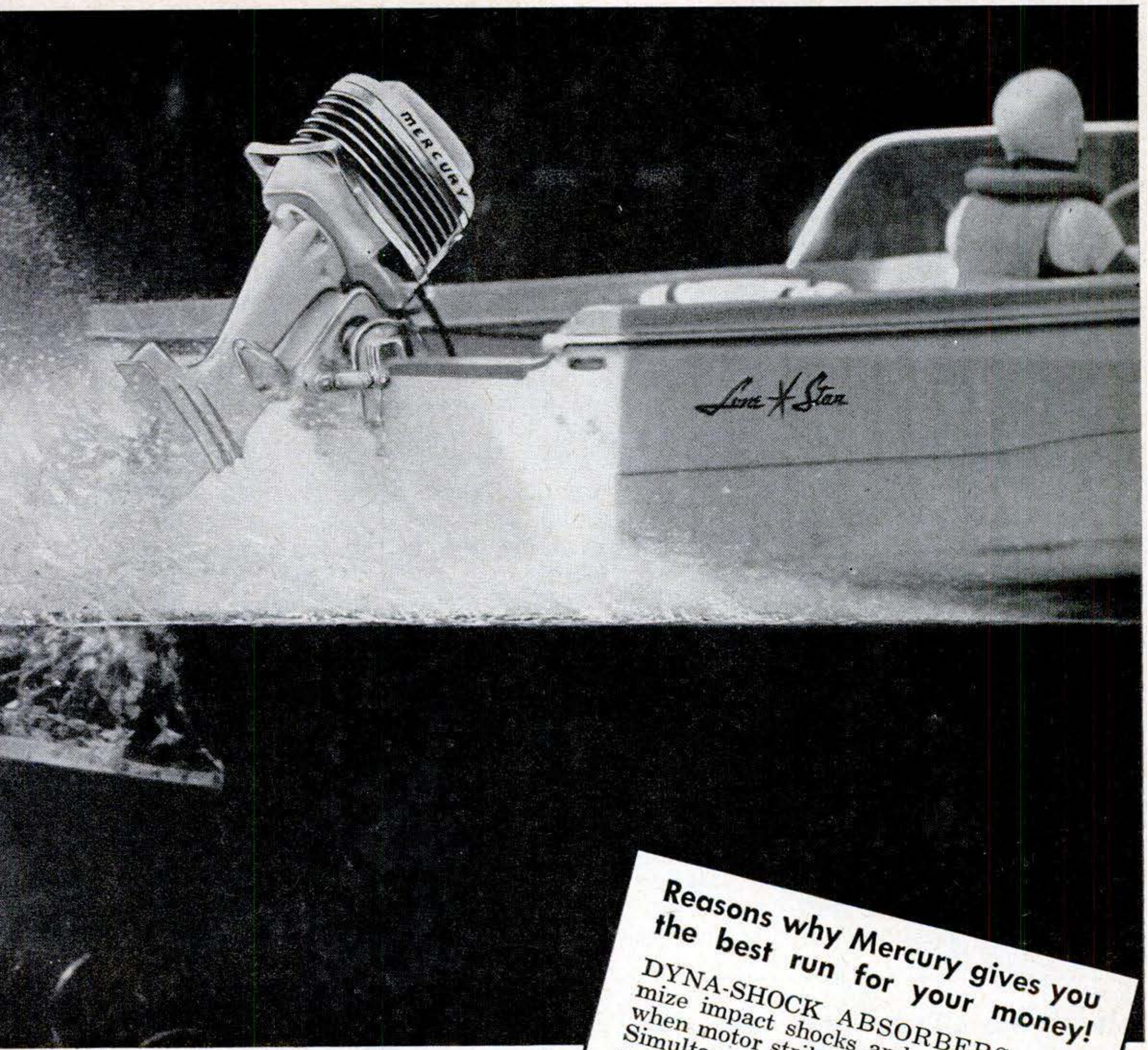
Only Mercury offers patented Glide-Angle Design twins — plus three *4-cylinder* engines in 40 to 50 hp classes — *plus* 6-cylinder family outboards! See your Mercury dealer . . . check his liberal trades, easy terms!

**Tommy Bartlett says:** *"In my Tommy Bartlett Water Ski Shows, our famous jumping boats with 22 hp Merc 200's have thrilled audiences around the world with over 30,000 jumps in the past two years — with never a motor failure! That's real dependability!"*

**WORLD'S NO. 1 OUTBOARD . . . 11 GREAT MODELS FOR '61 . . . 6 TO 80 HP!**



Copyrighted material




photographed at Florida's Silver Springs

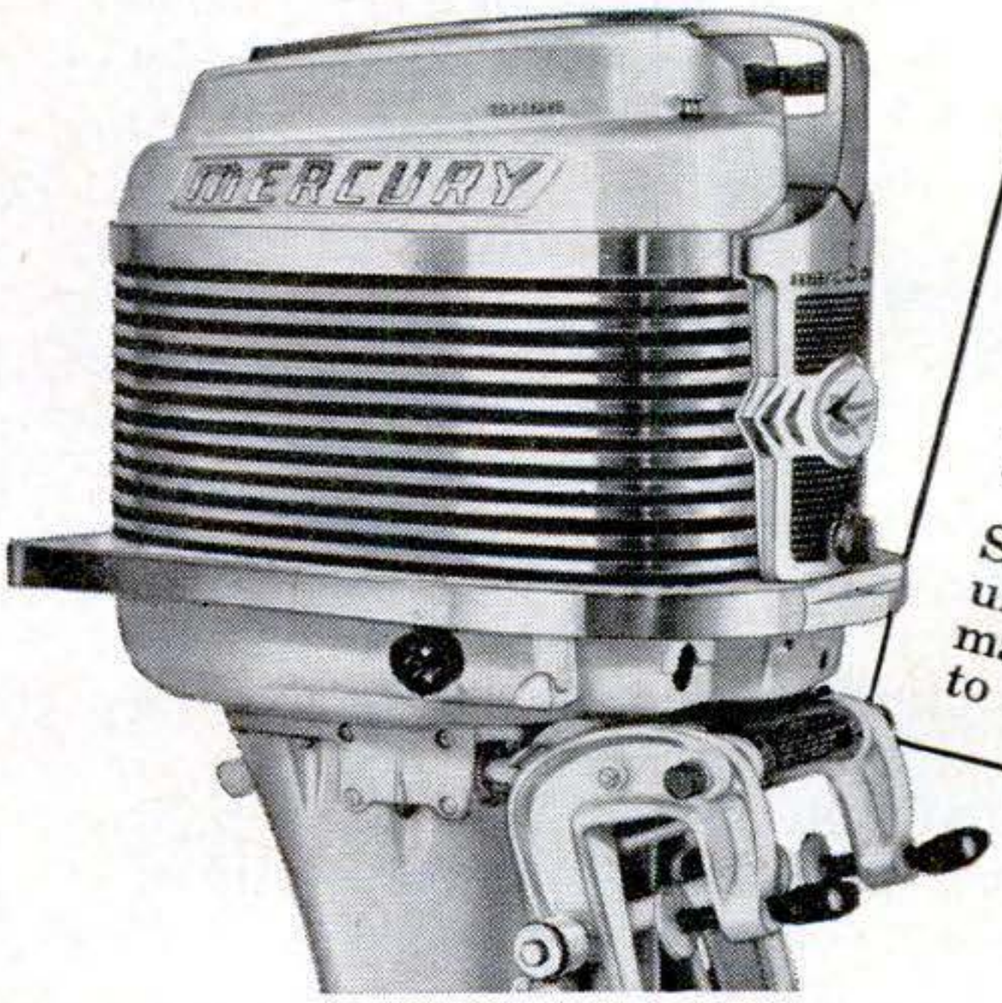
## Reasons why Mercury gives you the best run for your money!

DYNA-SHOCK ABSORBERS minimize impact shocks and rebound force when motor strikes a submerged object. Simultaneously, Safety-Tilt Switch automatically cuts ignition until propeller returns to water.

FORGED ALUMINUM CLAMP BRACKETS, heat treated to the strength of steel, are practically unbreakable. Fine-thread clamping screws give Mercurys super transom grip.

UNI-CAST LOWER UNIT has one-piece housing that maintains precise alignment of gears, bearings and shafts; more leak proof; eliminates bolts, gaskets and screws on highly stressed members.

STREAMLINED DESIGN of lower unit is hydrodynamically correct for maximum efficiency. No protruding nose to hook weeds and underwater objects.




50 hp Merc 500
most powerful four
in Mercury history

Under "Outboard Motors" in the YELLOW PAGES

KIEKHAEFER MERCURY

©1961
Kiekhaefer Corp.
Fond du Lac, Wis.

**WHERE OTHER OUTBOARDS LEAVE OFF . . . MERCURY TAKES OVER!**



Copyrighted material

# DETROIT REPORT

By Ken Fermoyle *PS Detroit Editor*

## Next: U. S. Cars in Three Sizes?

TOOLING orders placed recently by Ford and Chevy back up earlier rumors that both plan to offer bigger-than-compact but smaller-than-standard cars next fall.

The prototype of the Ford is about 197 inches long, has a 115-inch wheelbase, and weighs about 2,800 pounds. That makes it about a foot shorter and 1,000 pounds lighter than the current full-size Ford, and about a foot and a half longer and 400-500 pounds heavier than the 1961 Falcon. The new job will not replace either of those, but will cut into the number of full-size Ford models to be produced.

The new Chevy reportedly will have a 114-inch wheelbase, two inches longer than the B-O-P compacts, with which it is expected to share some body tooling.

A 244-cu.-in. V-8 being tested at FoMoCo's Arizona proving grounds may power the in-between Ford. The prototypes of this engine have experimental sand-cast aluminum blocks; but if the engine does go into the new model, it will be with a cast-iron block.

The new Chevy may get a new six-cylinder engine, but its design is difficult to pin down. Most "usually reliable sources" are betting on a no-nonsense short-stroke OHV in-line. The long-shot types think Ed Cole, Chevy's boss, may have a V-6 up his sleeve. In either case, the engine will probably have a cast-iron block, like its Ford competitor.

**Compact compact gets shelved.** Plans to bring out a short-wheelbase, four-cylinder small car for '62 have been canceled in South Bend. Instead, Studebaker will put its money into restyling the compact Lark and Lark Cruiser.

Reason for the decision: The market for compacter compacts is too uncertain in this country to warrant the tooling expense at this time. Studebaker prefers to try to strengthen its position in the proven compact-car field and let other manufacturers do the pioneering and take the risks with smaller cars.

**Aluminum engines hit snag.** Unexpected casting problems apparently will delay the introduction of several new aluminum-block engines in 1962 cars. Buick and Olds won't bring out the big V-8s with aluminum blocks in their full-size 1962 cars, as originally planned. Cadillac has put its aluminum V-8 on the shelf. Chevy may bring out a new six for '62 (see above), but will make it of iron, not aluminum.

Ford has never been enthusiastic about aluminum blocks, and is even less so now. Chrysler continues to cast some of its '61 slant-six blocks of aluminum, but may not be able to boost output high enough to switch over completely to aluminum for the sixes in 1962.

The trouble? When molten aluminum is poured into molds at production-line speeds, the finished engine blocks tend to be porous and to have "hard spots." The porosity was expected. Insiders say foundry men were counting on impregnators to seal the blocks satisfactorily. Hard-spotting, however, is a problem that threatens to wipe out two of the big economic advantages of aluminum—fast, easy machinability and long tool life. The development of hard spots, or points where the metal inexplicably is tougher than it should be, causes tools to slow down, jam, and even break.

Metal experts report you can solve the problems of porosity and hard-spotting by pouring more slowly, but this sends production rates plummeting and jacks up cost above practical limits.

Aluminum men, inclined to belittle current difficulties, say confidently that aluminum blocks will be used across the board within five years.



Copyrighted material

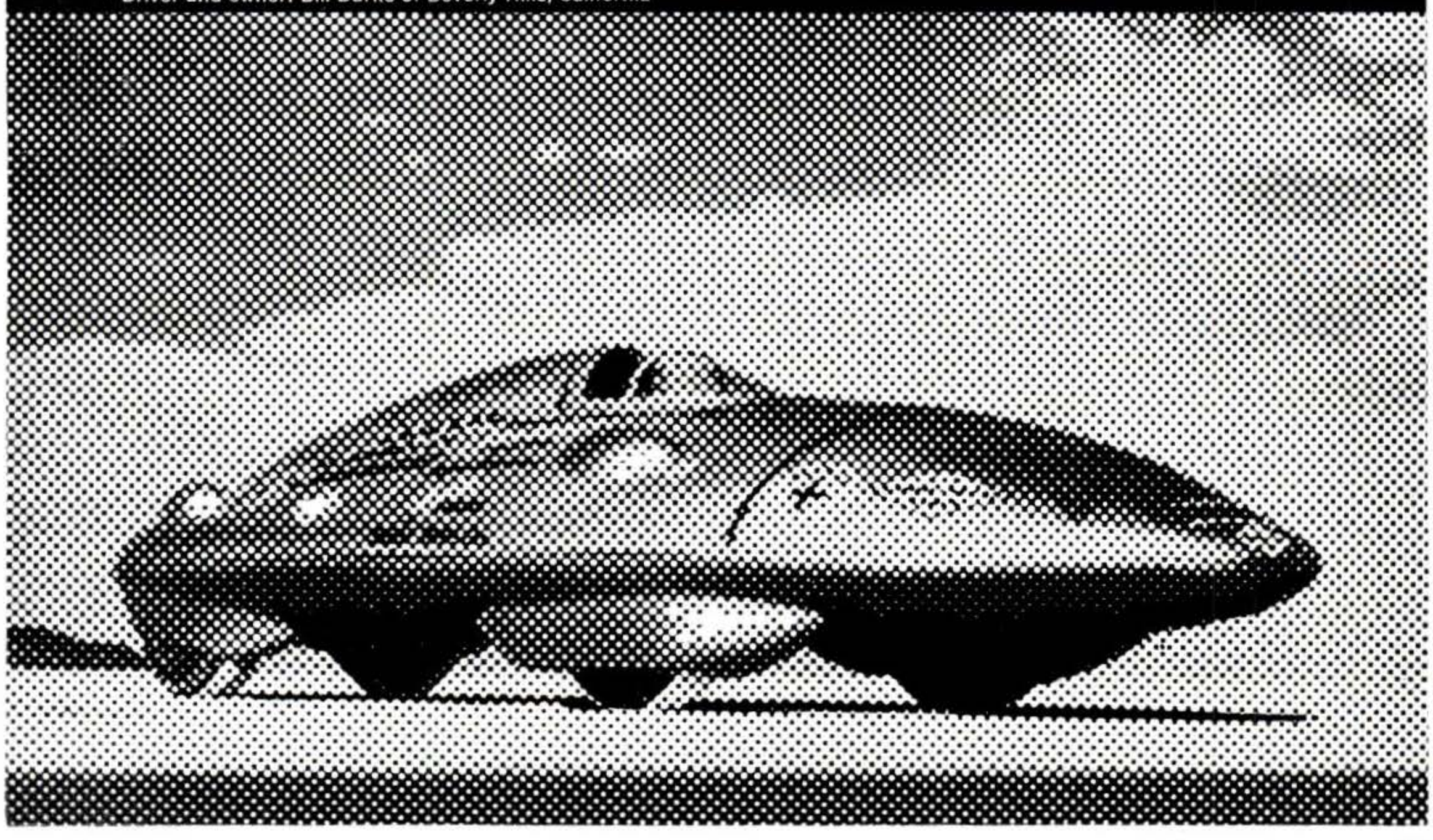
# FALCON-ENGINE PUMPKIN SEED HITS 205.949 WITH AUTOLITE SPARK PLUGS

Pumpkin-seed-shaped SCI Special slices to Class D record of 205.949 miles per hour across the salt of Bonneville, smashing the ten-year-old mark by over 43 mph. The engine: a 156-cube Ford Falcon in-line six. The spark plugs: Autolite. Lesson for the day?

**AUTOLITE®**
SPARK PLUG DIVISION • TOLEDO 1, OHIO

Makes no difference whether your car looks like a pumpkin seed or comes equipped with a Falcon engine, Autolite Spark Plugs can't be beat. There's a set made especially for the car you drive. As the pumpkin seed proves, you're always right with Autolite.

Driver and owner: Bill Burke of Beverly Hills, California



**Change to Luckies and get some taste for a change**

© A. T. Co.

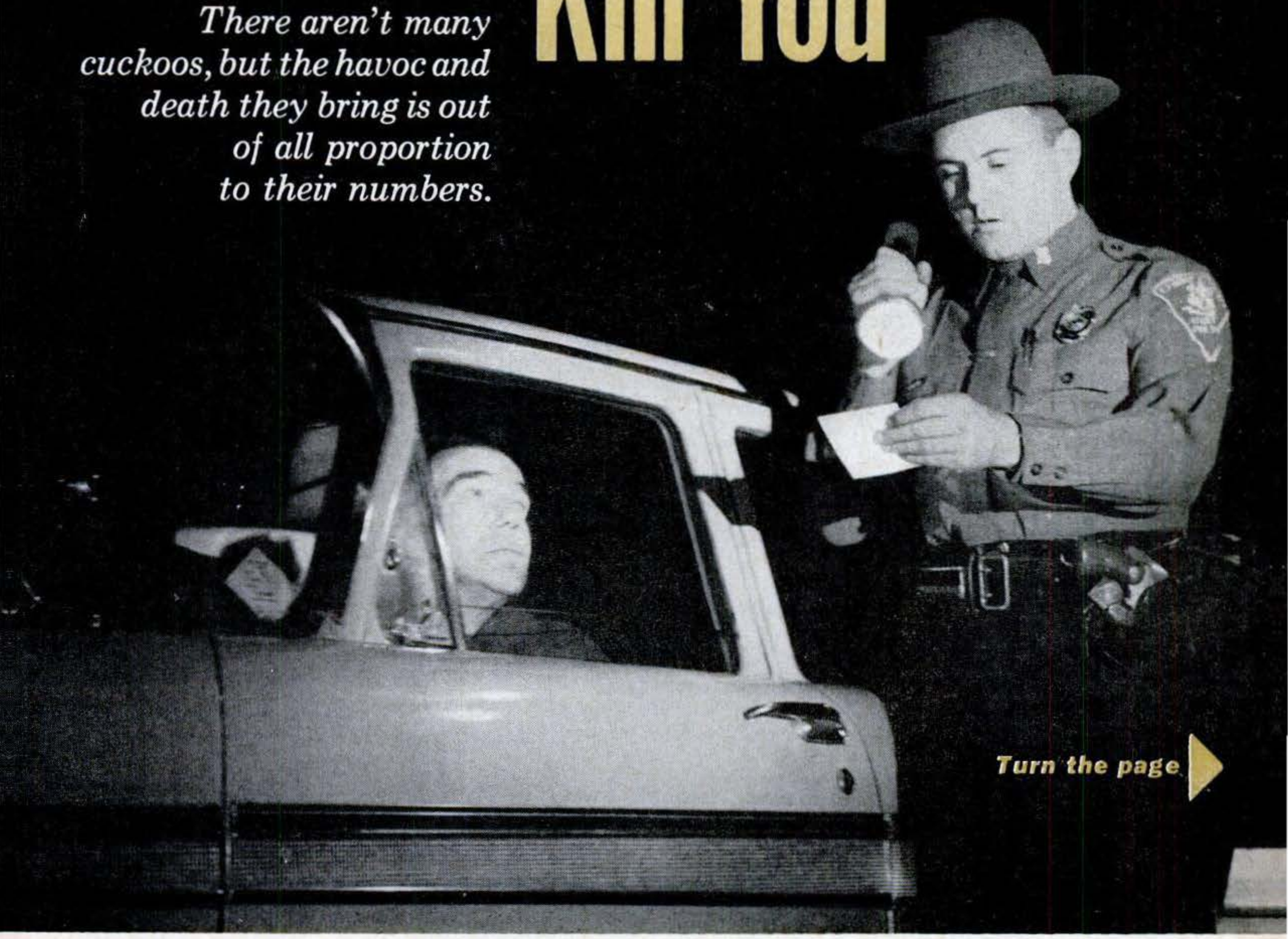
Product of *The American Tobacco Company* — "Tobacco is our middle name"

Copyrighted material

POPULAR SCIENCE
REG. U. S. PAT. OFF. Monthly

# Catching Drunk Drivers Before They Kill You

*In Connecticut the troopers call them cuckoos. Sometimes they're sober, but usually they're drunk —dead drunk. These are the ones who swerve through city streets at 85 m.p.h., who roar down crowded highways at 100 or faster. They're the ones who charge up the wrong side of a divided road at two in the morning. You may see their lights only once in your life. But then it's all over—you never had a chance. There aren't many cuckoos, but the havoc and death they bring is out of all proportion to their numbers.*



Turn the page



Copyrighted material

# *Like a cavalry troop scouting Indians, a unique "satellite patrol" wheels through Connecticut to nail killer-drivers*

**By Edward D. Fales Jr.**

ONE night not long ago a cuckoo loaded four friends into his car near Madison, Conn. He screeched out into the westbound lane of the 60-mile-an-hour Connecticut Turnpike. The trouble was, he was going east. When he hit the truck—head-on—five died.

Another one picked up a salesman, and got to bragging that his car could hit 110. Over the salesman's protests he tried to prove it. On a busy pike it was sheer madness. This one's victims were two folks returning from PTA.

Not all cuckoos are men. One grim night a woman, after too many drinks, drove east on the wrong side. A young couple, with their baby, never knew what hit them. The baby lived, an orphan.

To deal with such killer-drivers, Connecticut has launched a remarkable new kind of patrol. Six uniformed troopers in "satellite" cars are sent out to circulate around a seventh car. The driver of this car is the "eye" of the patrol and its leader. He drives an unmarked car and wears no uniform—which means that he sees a lot more than a uniformed officer in a regular cruiser would.

To avoid confusing drivers, he doesn't make arrests. His orders are: (1) Spot the bad ones and follow them; (2) vector one or two satellite cars to them by radio; and (3) see that the potential killers are grabbed before they can kill.

I WENT to Westport, Conn., recently to ride with a satellite patrol and see how it works. We went out cuckoo-hunting. We didn't have long to wait.

We began on the Connecticut Turnpike, a modern divided highway. In this area, 12 of the last 17 deaths had been caused by drinking drivers—not mildly tipsy guys who had some rein on their senses, but drunks so far gone they leaped the center strip and hit cars going the other way.

I was watching the smooth flow of Sunday-night traffic when Trooper Donald Waite said, "Tighten your seat belt. Fast one coming."

We'd parked by the eastbound lane of the big pike in TS18, a tan Ford. This was the key car. Waite wore a blue sports jacket and no hat. Our six satellite cars had moved out from Westport with us, and were deploying around us in different directions—but never more than 10 miles, or 7 minutes, away. We were the center of a hard-hitting, mobile task force.

We didn't know exactly where they were, though we had a general idea. We knew, for instance, that TS13, with

**RENDEZVOUS IN A SAND PIT:** Rovers without a permanent home base, men of the satellite patrol meet anywhere — back roads, bridges, village offices —for briefing on operational plan. Their missions vary, too. Among the recent assignments: Look for pay-night drunks rolling home from late spots, set up check points to screen drivers of all cars, patrol dangerously winding two-lane roads.



Copyrighted material

**THIS IS TS WEST,** one of two satellite patrols led by Sgt. Ernie Harris (center). Key man is plain-clothes leader, Trooper Don Waite, who spots and tails the killer-drivers. He radios uniformed troopers, cruising around him as satellites, to zip in and nab the "cuckoo."

Trooper Walt Trella, was somewhere up ahead. TS17, Charley Hyatt, was up there, too. TS, incidentally, stands for "Traffic Squad."

OUR first cuckoo went by like the wind—fast. Our car, TS18, looked like any other '59 Ford, but under the hood was a 430-cubic-inch (350-hp.) job called a "Thunderbird Interceptor." We went out like an arrow from a bow.

In the first dash—to get his number—we flew. We happened to go by a radar. The operator saw us coming and radioed: "Your speed is . . . one-zero-zero. He's eight seconds ahead." This was in a clear stretch. No cars. We got the number and slowed down.

Not so the cuckoo. He had gone by the radar at 91, still accelerating. At what must have been 110 he zigzagged through a pack of 10 cars traveling at the legal 60. It was bloodcurdling. A few more passes like that and there would be iron and people all over the turnpike.

Waite punched a radio switch. This cut off the regular headquarters channel and swung us over to the emergency 29.23-megacycle car-to-car channel, lifeline of a satellite patrol.

"TS18," Waite called, "to all TS cars. We are eastbound behind blue '56 Olds, terrific speed. Grab this guy quick before he kills some people."

For a moment, silence. Then things happened fast. TS17 checked in first. He was five miles east and coming toward us, but would turn and try to intercept the Olds. TS14, Jim Jacob, was two miles behind and coming up fast. One or two others were on nearby roads and immediately turned around and sped toward the pike.

We kept them posted. "He's about 20

**"FORD AHEAD MOVING FAST EASTBOUND,"** radios leader Donald Waite over direct car-to-car channel. Knowing where satellite cruisers are, he can order nearest one in to make arrest.

**PLUG-IN DASHBOARD BEACON** identifies unmarked cruiser as police car—but not until Trooper James Jacob wants it known. When he stops, beacon is moved to roof (note long cord).

CONTINUED



Copyrighted material

cars ahead of us . . . Moving from first to third lane . . . Just passing a big tanker."

Then a crisp voice cut in, loud and close. "I'm two miles ahead and waiting . . . I think I see him coming." It was big, good-natured Walt Trella in TS13. Silence again. Then Trella cut in. "I'm right behind him, Don. Man, is he a flyer."

Then Trella had him. TS17 and TS14 roared up to help. In three minutes they'd neatly lifted a death maker out of all that Sunday-night family traffic. His tires were paper-thin, and too hot to touch.

"These fellows lose control and everything explodes," Waite commented. They hustled the man off to a police station. We went back to looking for more cuckoos.

BY SUCH lightning tactics Connecticut is chopping down the killers. On roads around Danbury, highway killings for six months dropped from 28 to 14 when a satellite patrol moved in under a quick-thinking sergeant named Ernie Harris. (Such a saving, if maintained over a 10-year period, would total an incredible 280 lives saved in this area alone.)

Connecticut at present is running two satellite patrols, "TS East" and "TS West," and soon may have more. I rode for a day and nine nights with TS West and saw them pluck a number of cuckoos out of traffic. Some were fighting drunk. One, skillfully fished out of the wrong turnpike lane before he hit anybody, said thickly: "I feel sorry for all those guys going the wrong way."

**NIGHT-SPOT SURVEILLANCE** is steady assignment for the satellite patrol. Tipsy revelers who insist on trying to drive themselves home are arrested before they can cause any harm.

Each day we were posted on where the patrol would meet that night. For the satellites are rovers; they have no base of their own. The key car is a flagship that sets the strategy. Sometimes we met on lonely roads, once under a bridge in a rainstorm, sometimes in sand pits, and twice in a back room of a town hall.

There Trooper Don Waite or Sergeant Ernie Harris would brief us. One night, for example, we were to look for three-a.m. "pay-night drunks" rolling home from late spots. Another night we were to set up a surprise "check point" and screen all cars passing—especially toward midnight—for cuckoos.

After the briefing we'd roll out quietly. All our cars had those big Interceptor engines. And the plain car had a disappearing red flasher, clamped on top of the dash panel, that could be lowered to the floor to avoid drawing attention. Each car had three-way radio. (Whenever we transmitted we'd hear the dynamotor whirring under the rear deck.) Each car carried a kit for testing any driver arrested as a "DD" (police jargon for drunk driver).

THESE patrols are the work of an able, two-fisted lawman, Leo J. Mulcahy. Eighteen months ago Mulcahy, an up-through-the-ranks trooper, was picked by Abraham Ribicoff, then the state's safety-minded governor, to be his police commissioner. Mulcahy came to the job with a mission already planned.

For years as a trooper he'd been sickened by the highway deaths he'd seen. Many experts tell you that deaths are caused by decent people who make one fatal mistake. Some are. But Mulcahy knew that more than half the slaughter was being caused by hardened violators, criminals, and drunks. He knew, too, that many a driver reported as "going to sleep" at the wheel had actually passed out, but that newspapers don't dare say so unless there's a charge of intoxication.



Copyrighted material

## I'm not drunk." Nobody laughed.

**CHILLING EXAMPLE**—a horribly mangled Merc displayed on police trailer—is examined by Connecticut's State Police Commissioner Leo J. Mulcahy (center). An up-from-the-ranks trooper, Mulcahy organized the satellite patrols the day he took office (and had them in action that afternoon). Mulcahy blames most auto deaths on hardened violators, aims to get them off the road before they kill.

Mulcahy had also learned that hardened violators and nuts are often able to smell a uniform a mile away—and to go on good behavior. Hence his choice of a plain-clothes "eye" for each squad. Not one to fool around, Mulcahy set the squads up on his first day in office: July 1, 1959. At two p.m. they rolled out.

Within days the toll began to drop as word got around. Newton, Conn., which had had six recent deaths, sent an S.O.S. to the new patrols. TS West ghosted in. One of the first to learn about it was a local wild one. This fellow had learned that by sheer insanity he could outrun a cop. He tried it once too often. He went through Danbury's main street at 86 m.p.h. This time the air around him crackled with radio calls. Suddenly the TS men were everywhere—and he was in the net.

IT WAS on my ninth night with TS West that we met the bad one.

The night had begun with two or three small chases. Route 6 near Danbury is a narrow two-lane roller-coaster, a dangerous road. A red convertible came up fast behind us, passing cars willy-nilly on blind hills. He made his mistake when he gave us the business, too, and then narrowly missed a head-on crash on the hilltop ahead.

We roused two TS cars. He was startled when red lights began to blink all around him.

"What are you stopping me for? I didn't do anything," he protested.

They told him that Trooper Waite had been in one of the cars he had careered past. He was arrested.

WE WENT on. Soon we were on a road where not long ago two women, driving home late one night, had met a

[Continued on page 224]

**JUST '59 FORDS ON THE OUTSIDE,** unmarked patrol cruisers hide hopped-up mills under their hoods. The special police Interceptor engine gets 350 hp. out of its 430 cubic inches.



Copyrighted material

**STEERING PANEL,** instead of wheel, with Ray Besasie Sr. driving, guides car. He sits in the center, steers by swaying his knees. Hand knobs at corners give assist, if needed. Horn button is between them, shift stick up front. Toggle switches control the Explorer's lights.

# Knee pressure steers this car

No-hands driving is simple with this car. It steers, in traffic or on the open highway, by pressure of the knees on a panel under the dash. The driver sits in the center where he can judge distances on both sides. The ultramodern Explorer was designed by Joseph Besasie of Milwaukee, Wis., an associate of designer Brooks Stevens. It was built by his father and brother, Ray Sr. and Jr.—their third car in four years.

The Explorer has a modified Cadillac engine with 4-inch bore and 3⅝-inch stroke, 368-cu.-in. displacement, 10½:1

## Space possum

The saddlebag this opossum is wearing was tailored specially for him in the leather hobby shop at Kelly Air Force Base, Tex. It carries instruments to measure the animal's brain waves and heartbeat during a space experiment being conducted by the Brooks Base Aerospace Medical Center.



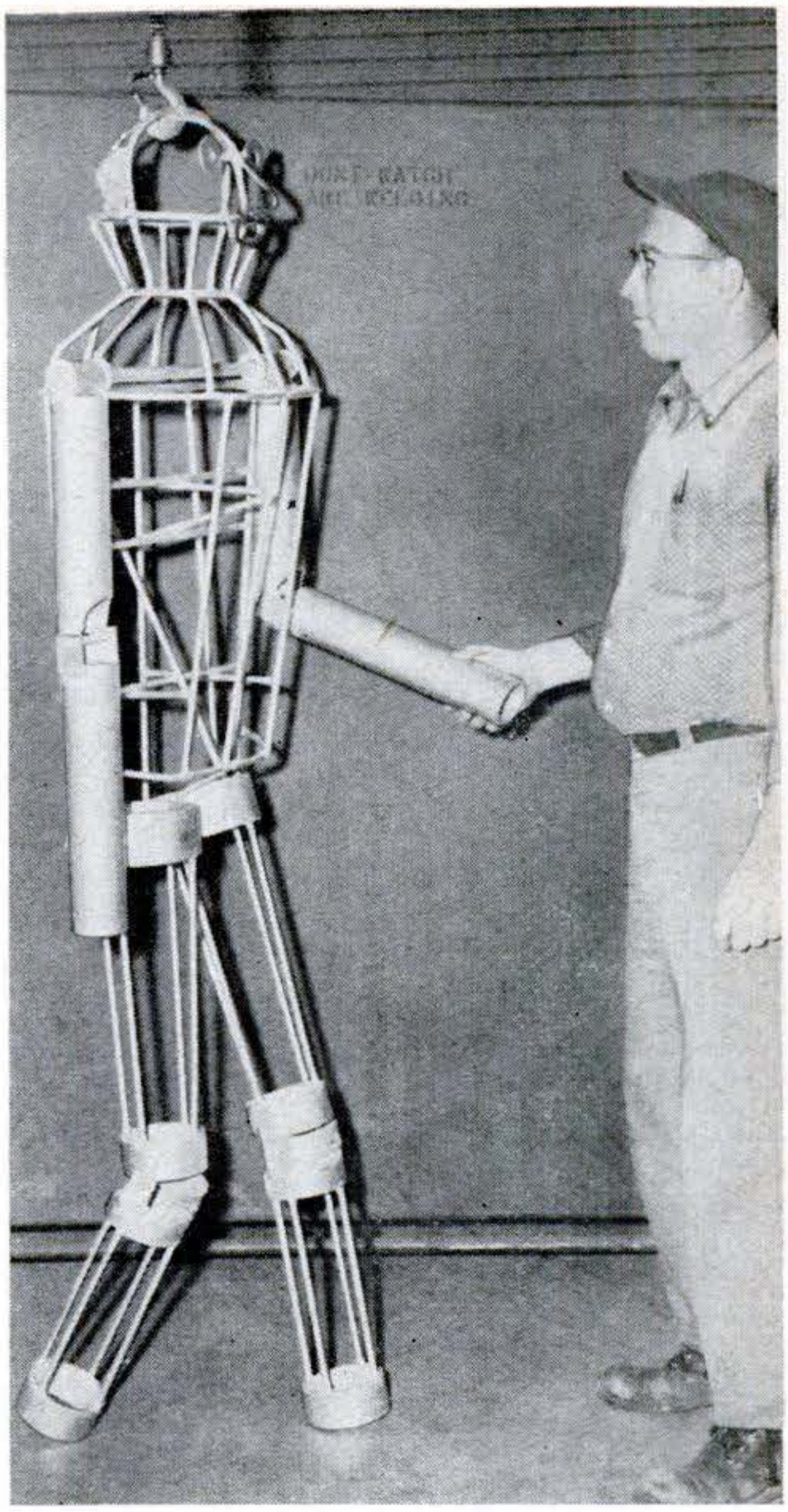
Copyrighted material

**HANDMADE BODY** is formed of aluminum. Indented step plates on both sides are for climbing in and out, eliminate need for doors.

**REAR VIEW** of Explorer reveals extra, central fins. Grille between them is ornamental; the eight-cylinder engine is up front under hood.

compression ratio. It develops 350 hp., gets 21 miles to the gallon. Top speed is 140 m.p.h. It's 19 feet, 4 inches long, and 72 inches wide.

The Besasies sold their first two cars after nationwide tours; this one was sold before it was even built. Price: $20,000—$15,000 for 3,000 man-hours' work, $5,000 for engine and materials.



## Bird-cage dummy

Wood-and-fabric dummies, used to train rescue crews in getting survivors out of crashed planes, have given way at Dover Air Force Base, Del., to this one constructed in the base welding shop. It's made of lengths of pipe and rods, is hinged at shoulders, elbows, waist, and knees to react like a man—and can better stand the flames accompanying a simulated crash.

## Multiple tandem

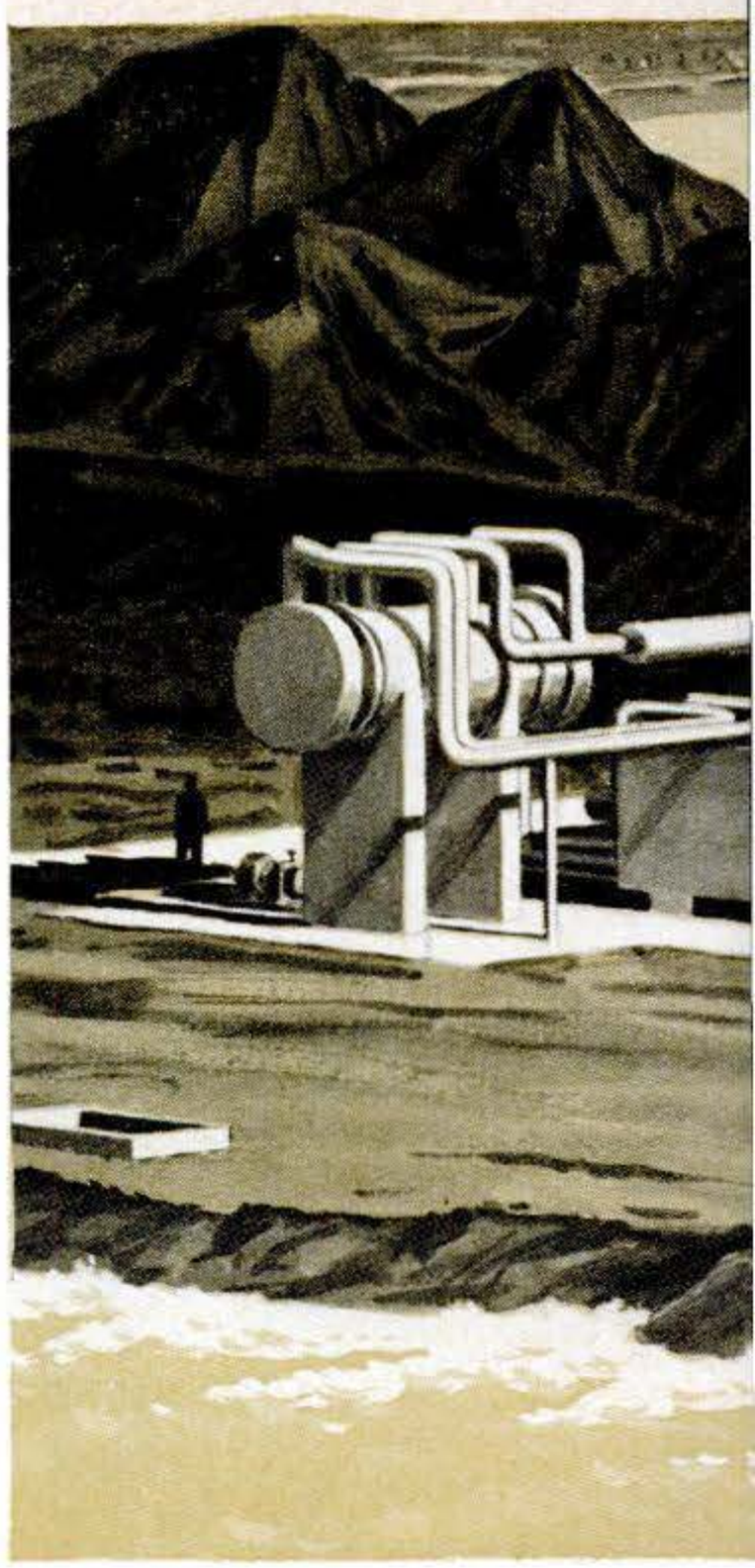
The eight houseboats at right, rigged together in two rows of four, made a 680-mile Mississippi voyage from Dubuque, Iowa, for delivery to marinas in Missouri and Kentucky. Powered by twin Mercury 80s, they were piloted from atop the rear two boats.

Copyrighted material

# Million-Gallon Tests Will Draw Fresh Water from the Sea

***San Diego's big still—possible forerunner of nuclear stills—will tap the ocean for drinks***

**By Wesley S. Griswold**



**BY END OF 1961** this plant at Pt. Loma, Calif., will be turning salt water to fresh in long, low evaporator chambers (foreground). Big storage tank in left background holds purified water. Tank in background at far right is for fuel oil, burned to heat sea water on its way to be boiled in evaporators.

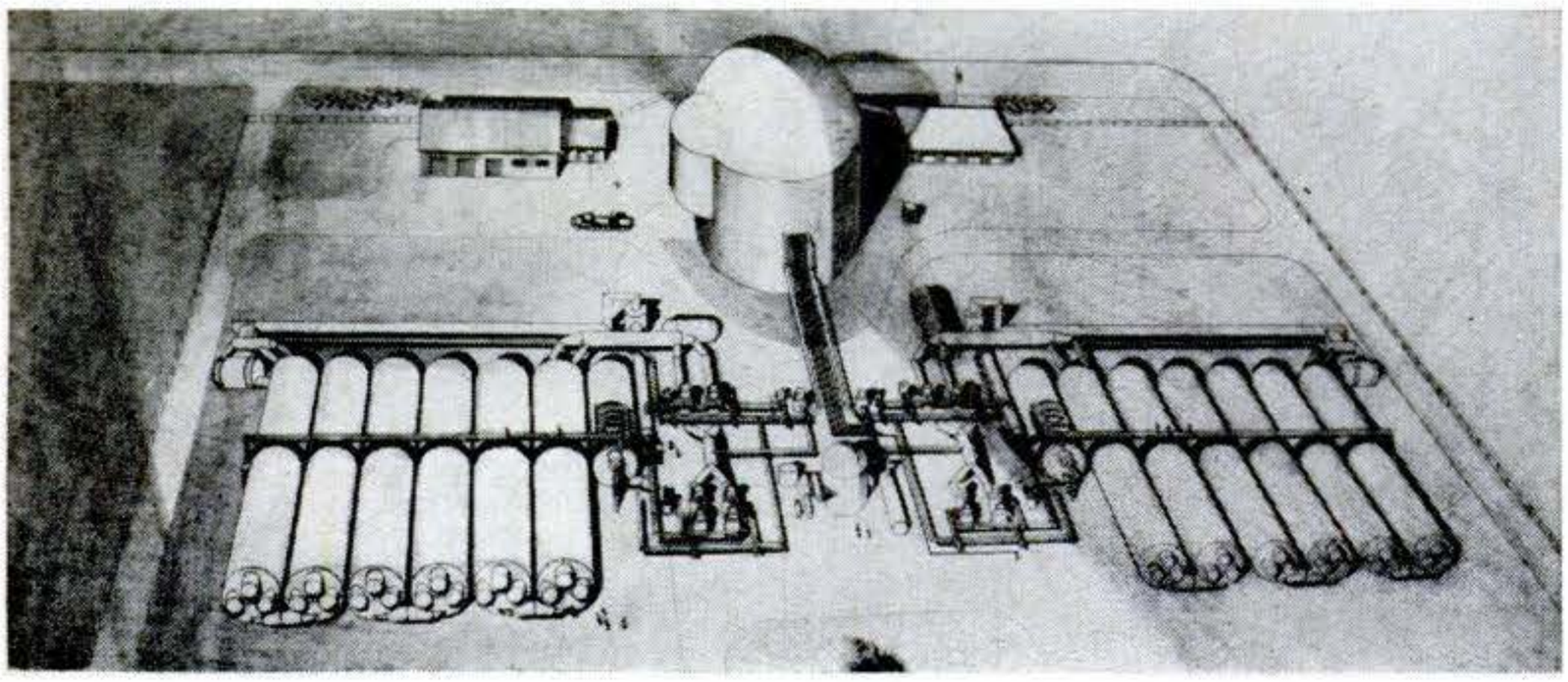
BEFORE the end of this year, San Diego will be drinking water drawn from a limitless reservoir—the sea. The draft will be a million gallons a day.

That's a drop in the bucket compared to the more than 75 million gallons that San Diego, a city of 573,224 people, already consumes in an average day. But the significance of the "drop" immensely exceeds its size.

The little salt-water-conversion plant now being built on the tip of Pt. Loma, at the entrance to San Diego's famous harbor, is experimental. It may, however, lead the way to a permanent solution of one of the world's most serious problems: how to find enough water for an exploding population.

***Water, water, everywhere.*** The problem is really not one of locating abundant water—seven-tenths of the earth is covered with it—but of making it available and drinkable at a practical price.

Tremendous progress has been made in cutting the expense of extracting fresh water from the oceans. Only eight years ago, the product cost $5 per 1,000 gallons. The pilot plant rising on Pt. Loma is expected to produce it for $1 per 1,000 gallons. Looking ahead a dozen years, the engineers who designed the plant predict that a very much bigger one of the same type, using nuclear heat and pouring out 130,000,000 gallons of fresh water a day, could cut the cost of purifying the briny deep to as low as 24 cents per 1,000 gallons. They foresee a number of these nuclear-heated conversion plants eventually dotting our seacoasts. By that time, the same engineers estimate, obtaining new supplies of fresh water from the



**MODEL SHOWS** bigger-scale plant for same multistage flash-evaporation process as at Pt. Loma, but with heat supplied by a nuclear reactor, in domed 140-foot-high building. Installation of this size would provide 50 million gallons of fresh water a day, enough for 250,000 people.



Copyrighted material

dwindling sources we now tap will in many places be more expensive than removing the salt from sea water.

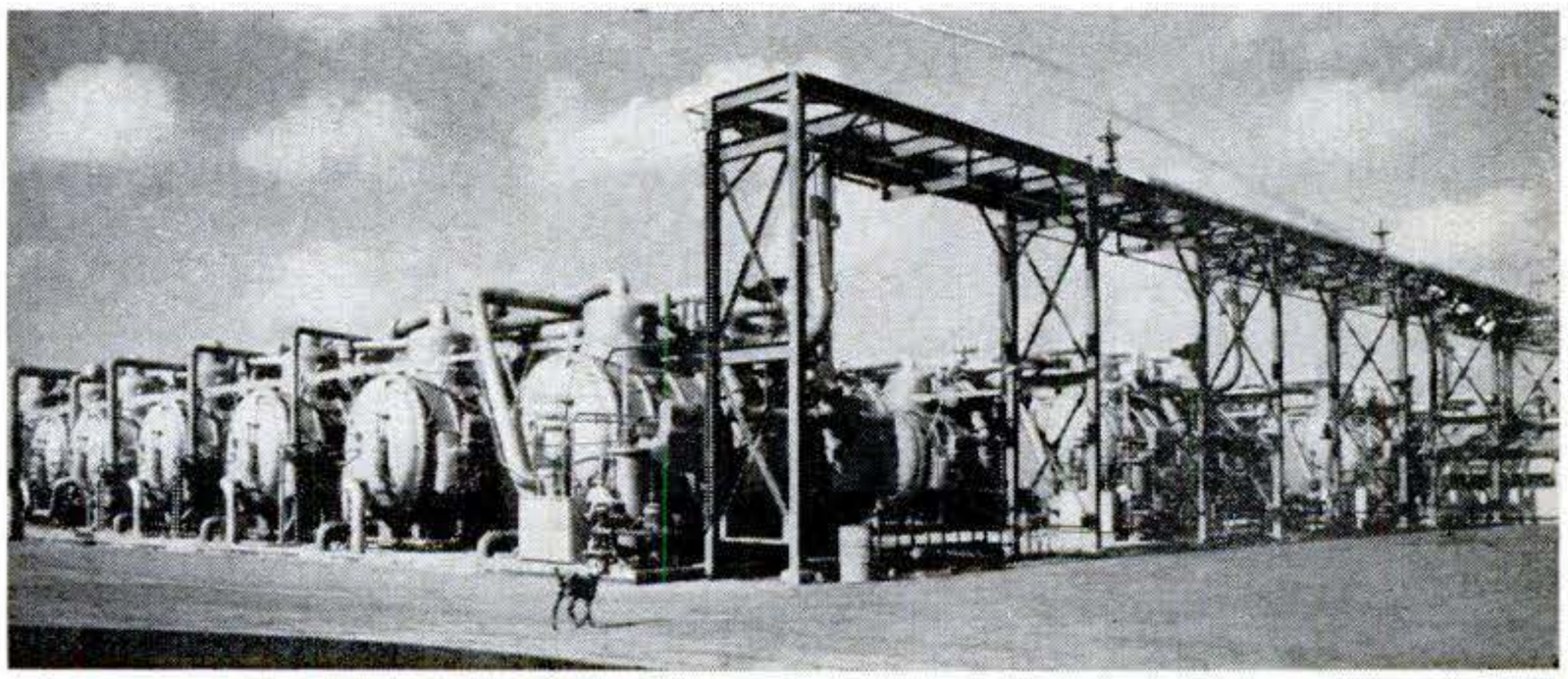
Let's look at the installation taking shape at the mouth of San Diego Harbor. Westinghouse is building it. The Fluor Corp., of Los Angeles, designed it. The U. S. Interior Department and the State of California are putting up the $1,600,000 to pay for it. San Diego has contracted to take its entire output.

The plant is rising on a 50-acre shelf of land 36 feet above mean low tide. Its essential units—long, horizontal evaporators, pumps, oil-fired steam boiler and tall smokestack, storage tanks for fresh water and fuel, a low building for offices and shop—will occupy only a small portion of the site, a plot 350 by 300 feet.

***Siphoning off an ocean.*** Sea water will flow in by gravity, coursing down an inclined 24-inch concrete pipe whose mouth will lie 700 feet offshore and 11 feet below the level of the lowest tide. The water will be screened at the intake. At the shore end of the pipe, there will be a sump. Salt water will be pumped to the evaporators from there.

In essence, the conversion plant at Pt. Loma will be an elaborate and cunningly refined teakettle. It will boil salt water, condense the pure steam that results, and collect the fresh water for distribution.

Ironically, the end product will be so

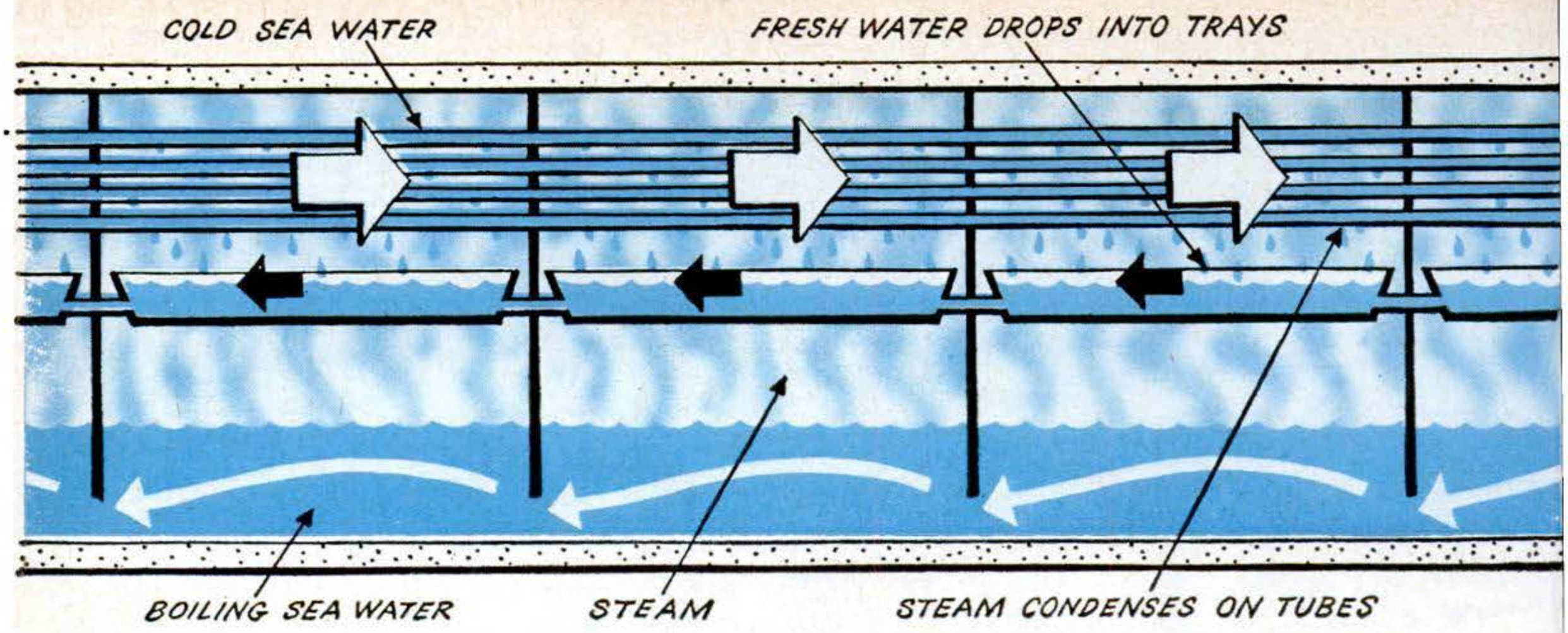


**BIGGEST IN WORLD** in operation so far, this sea - water - conversion plant supplies needs of 55,000 people on island of Aruba, near Venezuela. It produces 2,700,000 gallons of fresh water daily by same multiple-effect distillation process U.S. will try out at Freeport, Tex.

CONTINUED



Copyrighted material




**HOW SAN DIEGO PLANT DESALTS WATER** is shown in cross sections of evaporators, above and opposite, and in simplified flow chart on rest of facing page. At subatmospheric pressure in evaporator, hot sea water flashes into vapor. Fresh water condenses on cold pipes and drips into collecting trough. This repeats itself in 36 chambers at successively lower pressures.

pure that it won't taste good until a few ingredients have been put back in it. Until mixed with air and a judicious assortment of chlorides, sulfates, and carbonates, it will be tasteless.

The process used in this conversion plant is called multistage flash evaporation. Another, and less efficient, version of it is daily making 2½ million gallons of drinking water for the people of Kuwait—the tiny kingdom that bakes beside the extremely salty Persian Gulf.

The process involves sending sea water on a short round trip through a series of evaporators. Each evaporator contains a number of vacuum chambers, separated by vertical baffles. These compartments are the "stages" of the process. There will be 36 of them in the installation at San Diego. Temperature and pressure vary by precise degrees from stage to stage.

***No bubbles allowed.*** As the incoming sea water starts its journey through the system, a de-aerator first takes all the air out of it. That is done so that escaping air bubbles will not hinder maintenance of a partial vacuum, later in the process; and also to prevent oxidation of the metal en route. The water is then treated with chemicals to inhibit the formation of scale when it's heated.

On the first leg of the trip, the sea water travels in a bundle of tubes running along the ceiling of each evaporator. As it passes through one chamber after another, the water in the tubes is gradually heated. It remains under constant pressure to prevent it from boiling, until that becomes desirable.

At midpoint of its journey, the saline water circulates through tubes in a steam heater. There its temperature is raised to about 220 degrees F. It then starts back the way it came. But now it is no longer in pipes; it has become a river of hot brine flowing along the bottom of each evaporator.

Here, halfway through the system, is where flash evaporation begins. As the brine enters the first stage of its return trip, it encounters slightly reduced pressure. Instantly, a part of it boils (flashes). Steam rises and condenses on the tubes carrying incoming sea water toward the heater. The water in the tubes absorbs the heat of the steam. The pure condensate formed on the outside of the tubes drips into a trough lying beneath them.

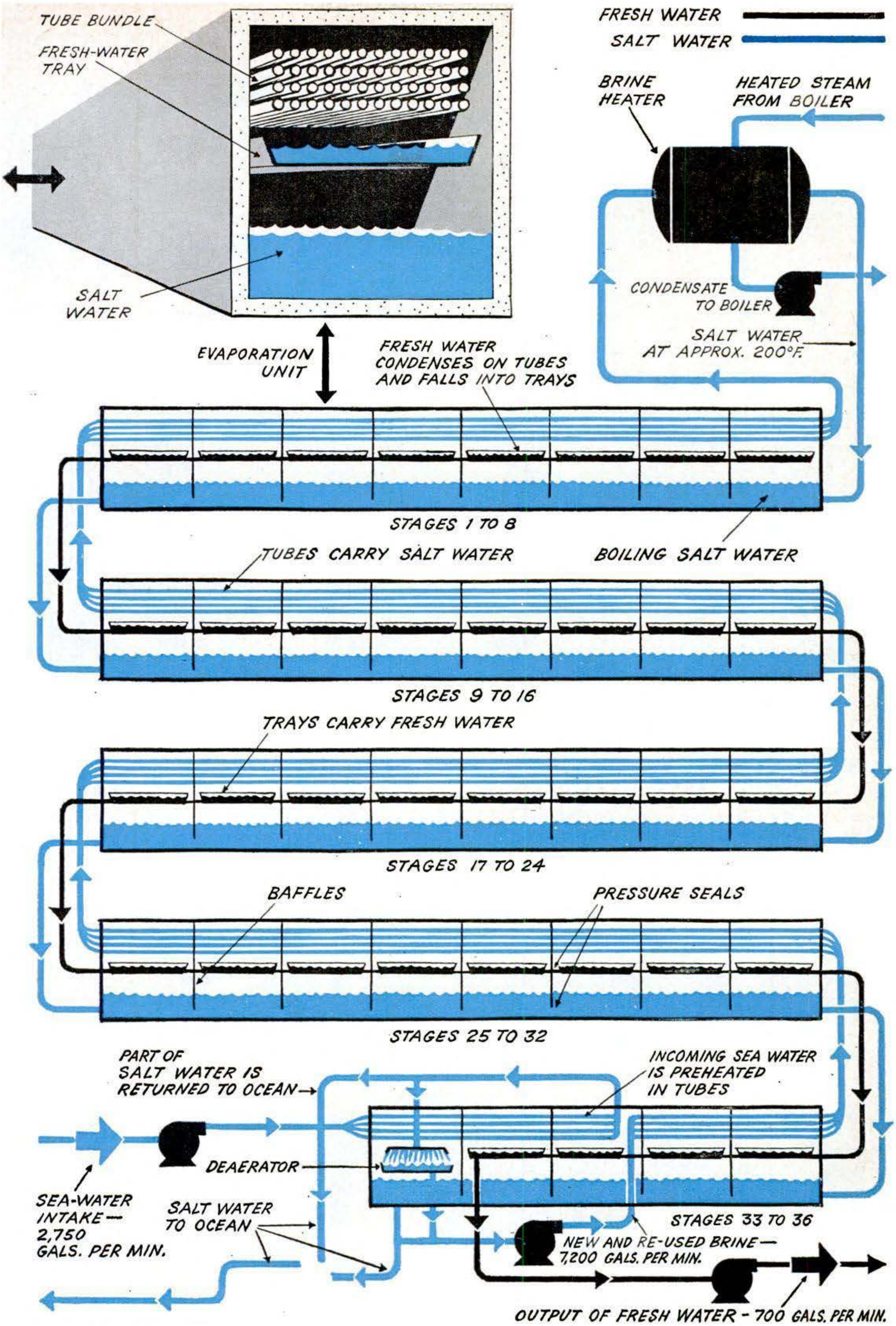
Then, brine and condensate flow into the adjoining chamber, where pressure is lower. Here again the brine boils and gives off steam. More pure water forms on the tubes and drips into the trough.

This process is repeated, through stage after stage, until the return journey is over. In the final chamber, water fresh from the sea, with a natural temperature (at San Diego) of around 65 degrees, is just entering the overhead pipes. The brine, heated to 220 degrees when it left its steam bath, by now has cooled to

[*Continued on page 230*]



Copyrighted material






Copyrighted material

EXHAUST

COMPRESSORS

AIR INTAKE

COMBUSTION CHAMBER

POWER TURBINE

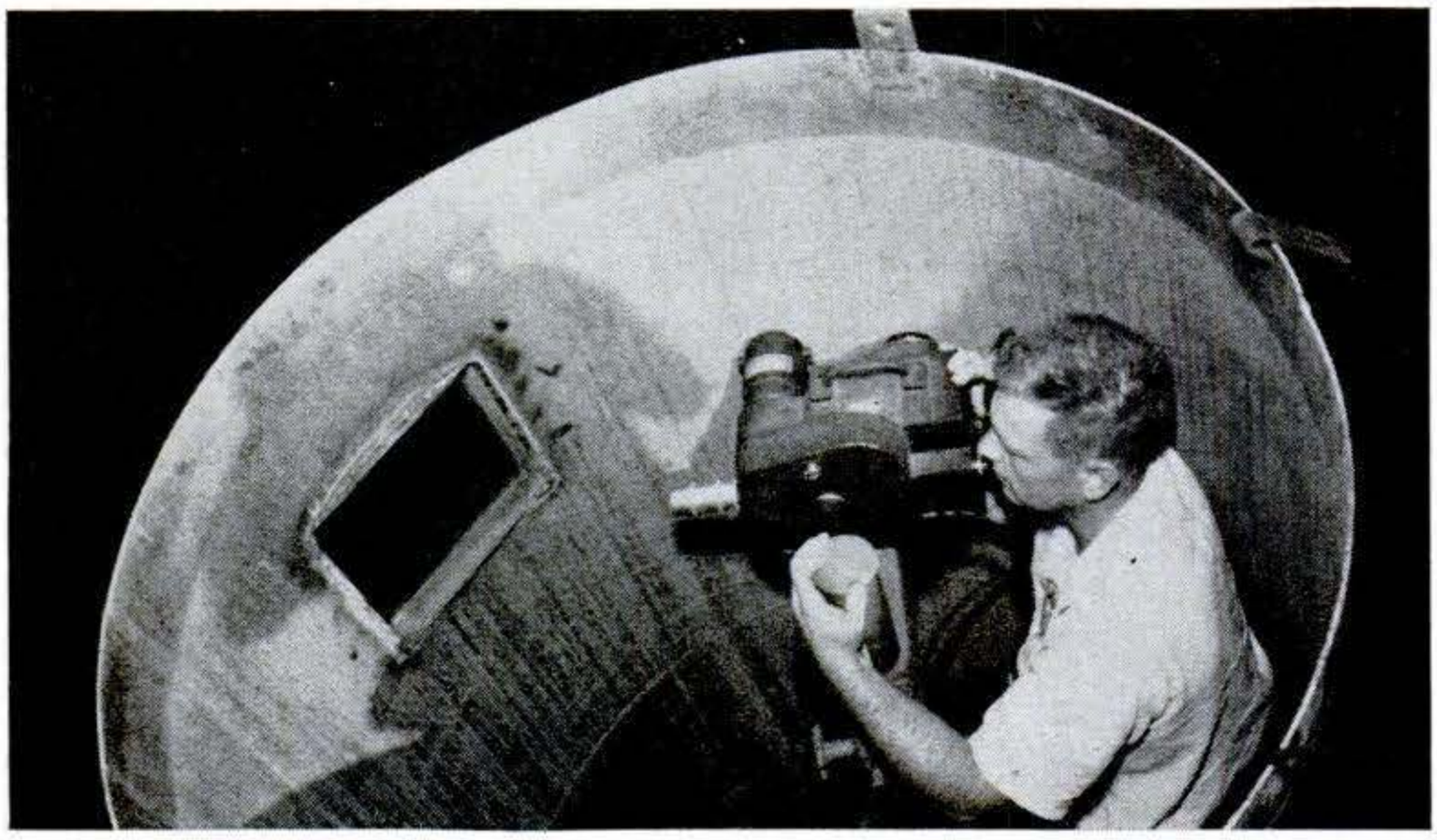
POWER TAKEOFF

JET TURBINE

## Aircraft jet does down-to-earth job

An aircraft turbojet spins a free turbine above—the first industrial use of an airplane jet. No shaft connects the two; blast from the jet spins the turbine, which boosts flow of natural gas on its way to the East. The jet is powered by some of the gas it helps pump. The installation is in a pumping station at Possum Trot, Ky., being tested by Pratt & Whitney, Cooper-Bessemer, and Columbia Gulf Transmission.

Advantages so far over conventional turbines: lighter weight, cheaper installation, lower fuel and operating costs, no regeneration system needed, no attention required for at least a year.



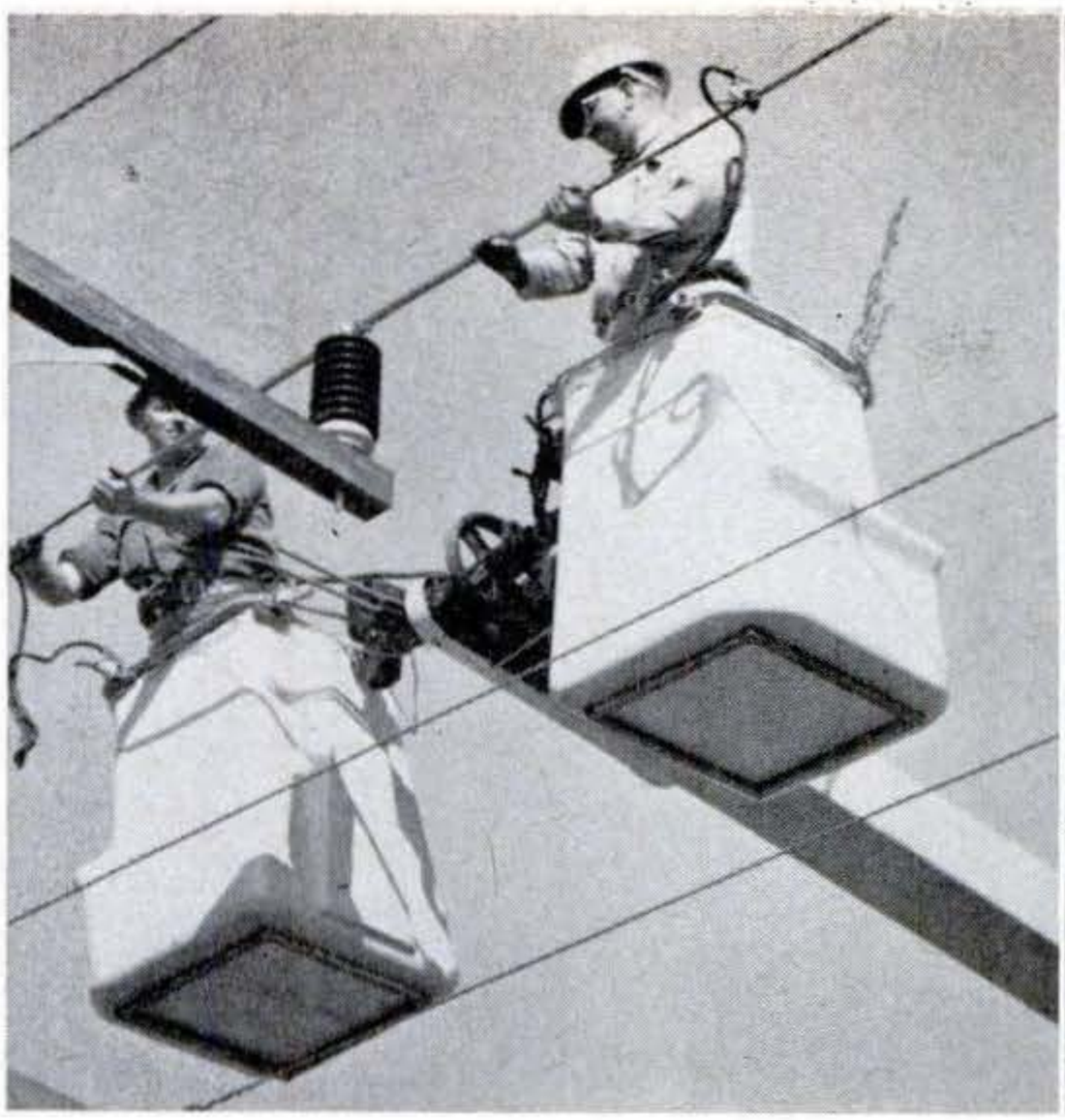
## Underwater photography

Crouching below water level in a protective tank, this photographer uses a high-speed camera to take pictures of uranium-fuel elements.

It's part of a GE study to show engineers how waste elements will behave when discharged from a new atomic reactor being built at Hanford, Wash.



Copyrighted material



**WHAT, NO GLOVES?** These linemen work in safety with bare hands on a high-voltage wire.

**BOOM ON TRUCK** is insulated so current from live wire can't pass through it to the ground.

## No fear of shock

Working barehanded on a live wire, these two American Electric Power linemen repair a 34,500-volt line near Findlay, Ohio. They stand in nonconducting fiber-glass buckets supported by an insulated boom on a rubber-tired truck. The metal lining of the buckets is connected to the live wire, charging the men with the same voltage. But no current passes through them since they are as electrically isolated as a bird sitting on a wire.

The idea is new in power-line maintenance. It's safer, less cumbersome than using the familiar insulated hotstick.

## Airborne radome protects Navy ships

A structure that looks like an oversize bridge table now rides on top of a special kind of carrier-based Navy plane. It's a radome, designed to alert Navy task forces to the presence of enemy planes hundreds of miles away.

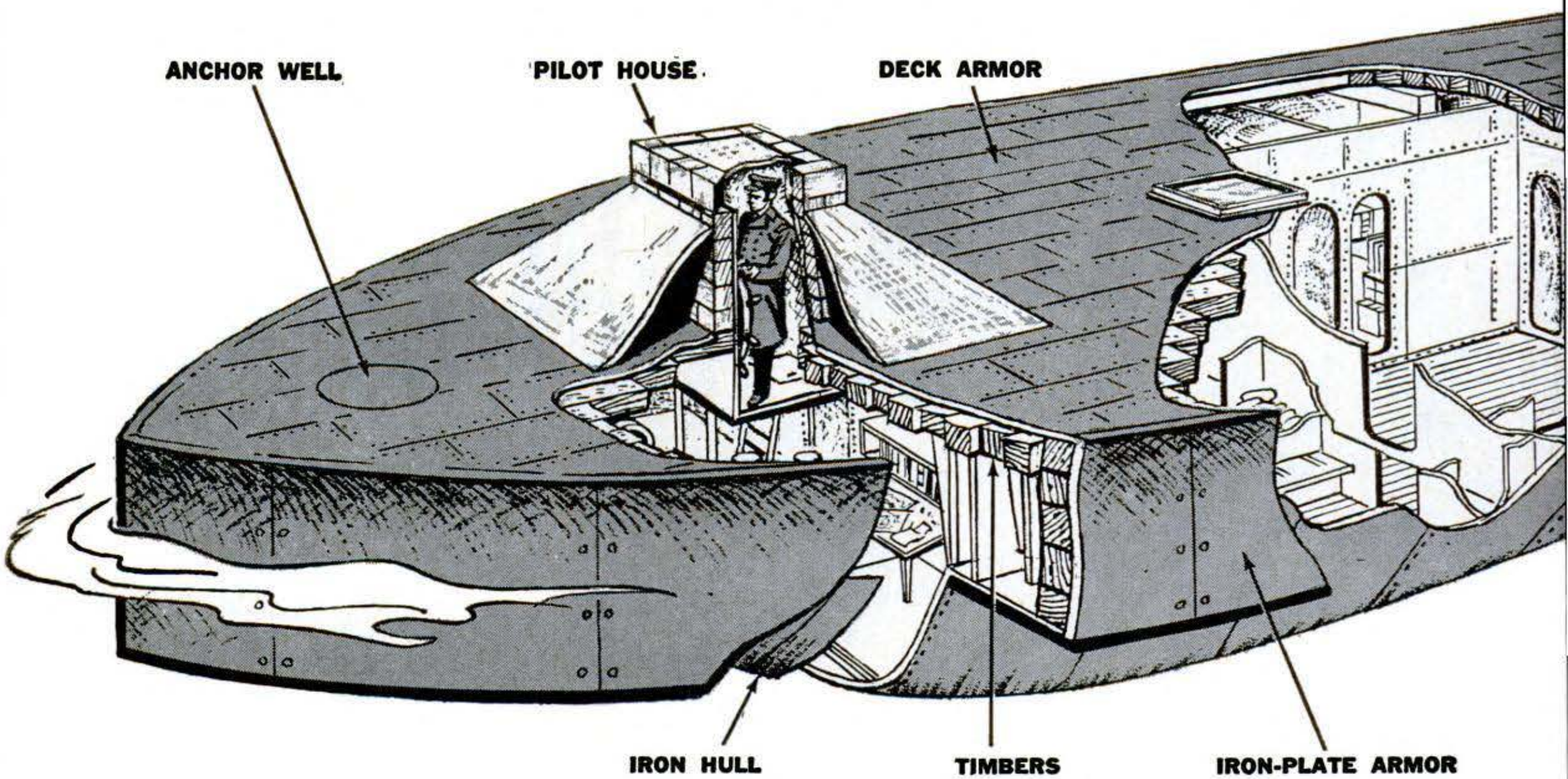
The special aircraft are Grumman Hawkeyes propelled by two turboprop engines. The surveillance radar in the flattish dome is combined with a computer "brain" in the airplane that supplies instantaneous information to fighter planes waiting to intercept intruders.

The radome stands six feet above the plane's fuselage. To make storing the planes in below-deck hangars possible, hydraulic motors lower the radome 22 inches. The W2F-1 Hawkeye is a sister plane to the Navy's Super Constellation WV-2E radar picket plane used as an airborne extension of the DEW Line —our arctic early-warning system.



Copyrighted material

# The MONITOR: History's Strangest Warship




***A hundred years ago, they laid the keel of the Monitor—the iron ship that would sound the death knell of wooden navies***

**By Harry Walton**

A NAVAL crisis early in the Civil War was met by an engineer, a 100-day shipbuilding miracle, and a vessel like none the world had ever seen—the Monitor.

The impetus to build this iron freak was a fear that the Confederates might break the Union blockade with ironclads. Unable to match the North ship for ship, the Confederates counted on armored ones to even the odds. One such was the captured U. S. frigate Merrimac, rebuilt with a casement of wood and iron plate, fitted with a formidable ram, and renamed the C.S.S. Virginia.

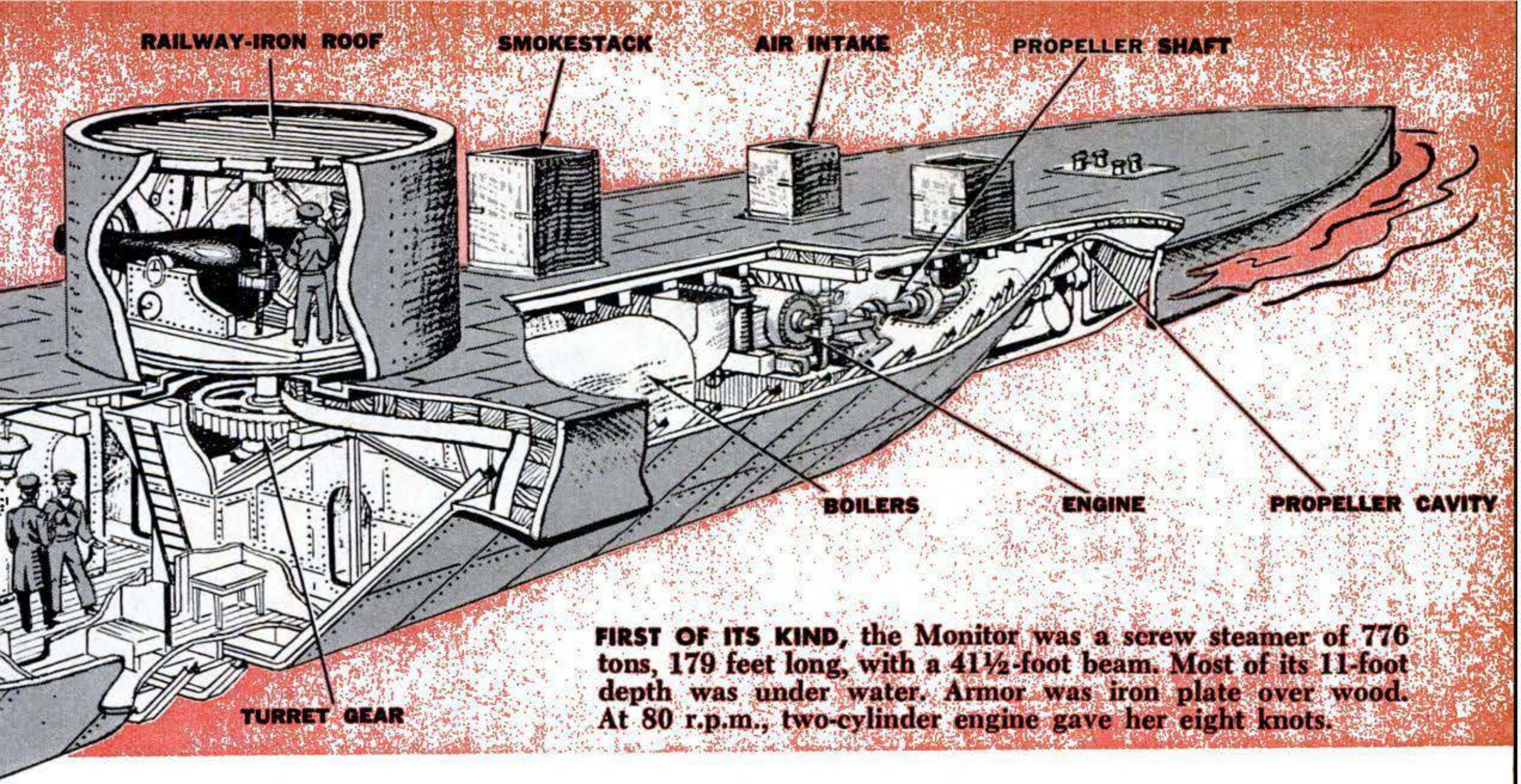
So high were Southern hopes for her that Stephen Mallory, Secretary of the Confederate Navy, proposed sending the vessel to shell and burn New York and its shipping. "The Brooklyn Navy Yard and all the lower part of the city could be destroyed . . . Peace would inevitably follow," he wrote. This was wild optimism. Actually, when afloat, the ship's armor sank her to a draft of 22 feet and made her unable to navigate in heavy seas or carry coal for more than a few days. Her defective engines could lug her along at no more than five knots. But apprehension ran high, for ironclads were new and fearsome things.

The Union navy had been reluctant to adopt them, even though England and France had such ships. But to John Ericsson, a Swedish engineer who spent most of his fruitful life in this country, ironclads were no novelty. Napoleon III had used them in the Crimean War. In 1846 Ericsson himself, having developed powerful guns, said that enough armor to withstand them would sink a ship—and then countered by drawing plans for a revolutionary new kind of vessel. These, dusted off in 1861, became the Monitor.

It embraced several of Ericsson's firsts —engines wholly below deck, fires sup-



Copyrighted material

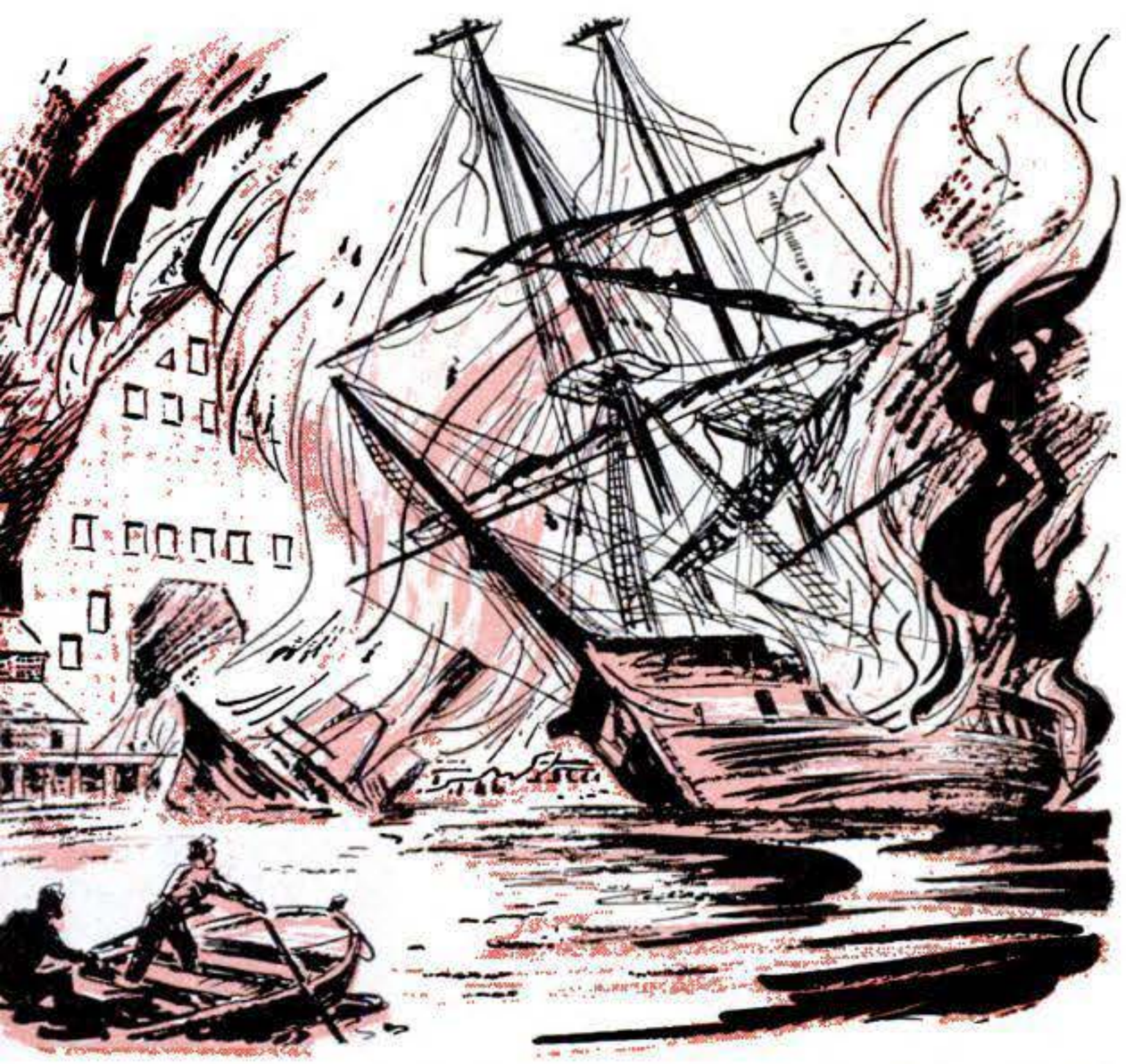



**FIRST OF ITS KIND,** the Monitor was a screw steamer of 776 tons, 179 feet long, with a 41½-foot beam. Most of its 11-foot depth was under water. Armor was iron plate over wood. At 80 r.p.m., two-cylinder engine gave her eight knots.

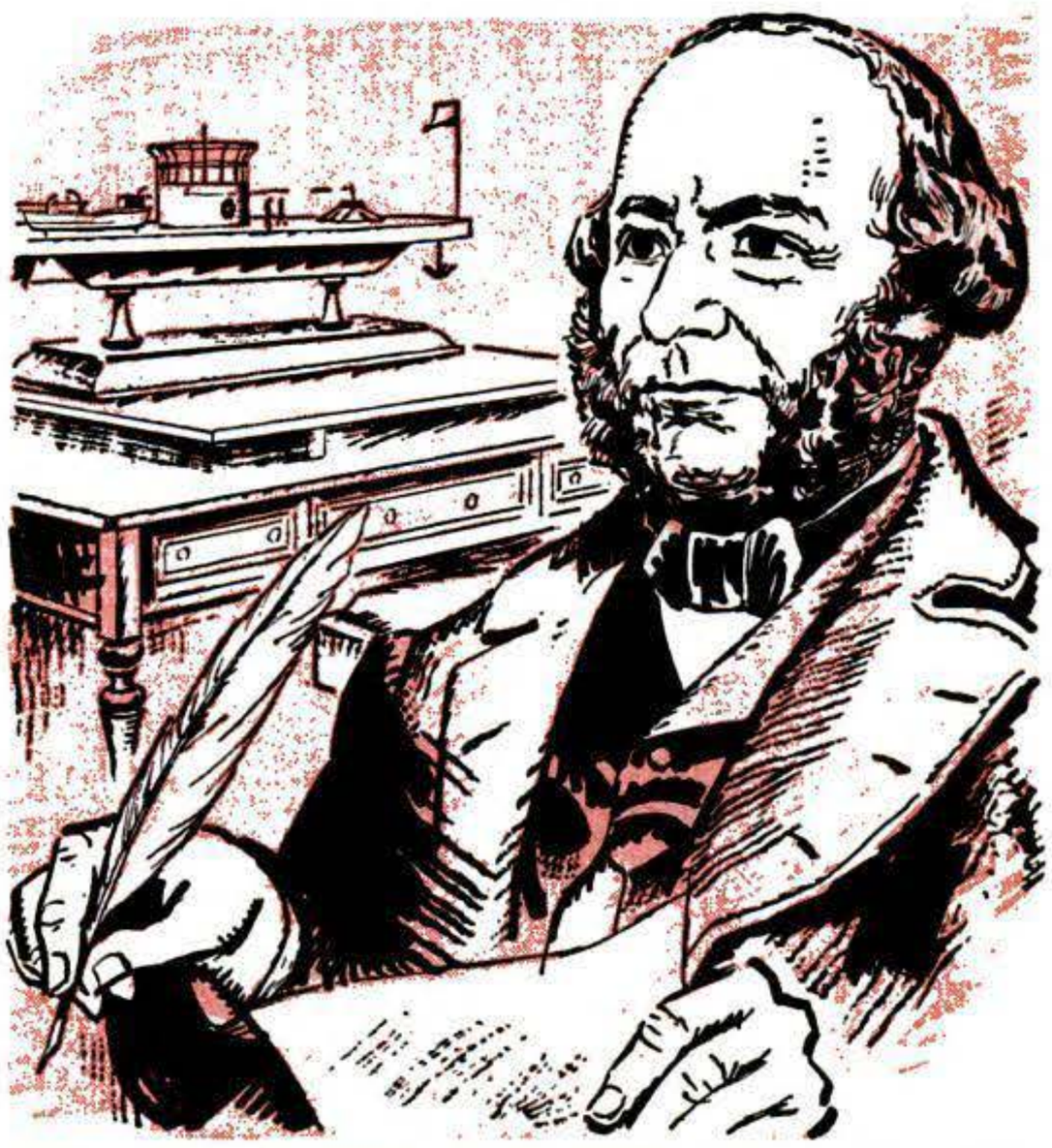
plied with air by blowers, a movable gun turret, recoil carriages, direct coupling between engine and screw.

A grossly one-sided contract required Ericsson to build the ship in 100 days, but to be paid only 75 percent of its $275,000 price (a third that of a frigate's) until the Navy had accepted it. The test was to be exposure to enemy fire. Should the Navy reject the ship, all funds paid were to be returned.

The contract called for masts and sails on the ship, but Ericsson ignored this. Just 132 days after her keel was laid, the Monitor steamed south to her rendezvous with history.



**APRIL 19, 1861** At Norfolk Navy Yard, U. S. steam frigate Merrimac lay with engines dismantled as secession fever mounted. Union efforts to get the ship away failed. On the 17th, Virginia had seceded. Two days later Federal marines scuttled the ship, set time fuses to burn the drydock and 3,000 cannon. Southern troops saved these. The ship burned to the water line and sank, but was raised May 30 to join the Confederate navy.

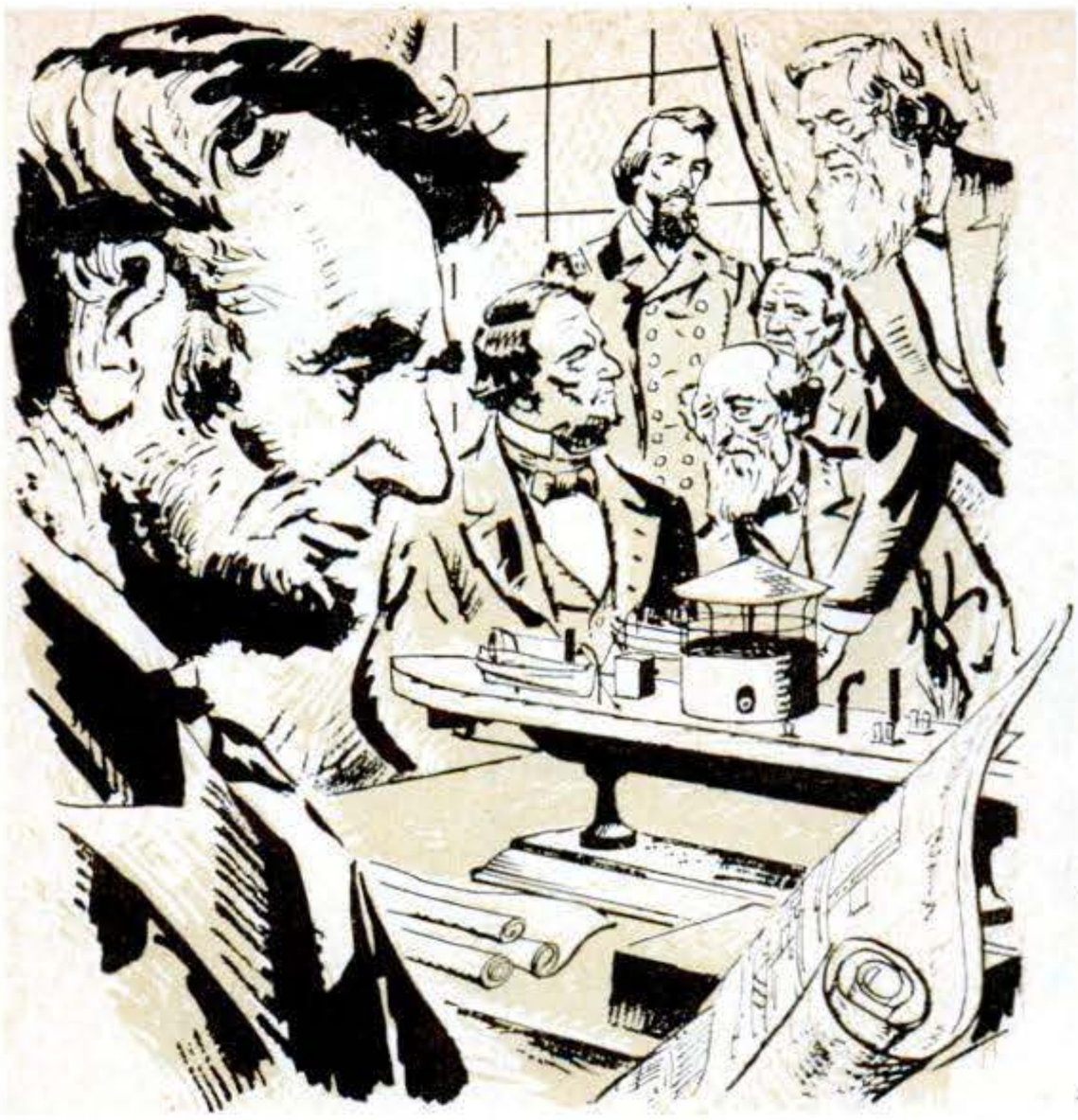


**AN ENGINEER WRITES** Knowing that the Confederates were rebuilding the Merrimac as an ironclad, the Union navy, with only wooden ships, advertised for plans of armored vessels and set up a board to consider them. Inventor-engineer John Ericsson responded with a letter to President Lincoln. He offered to build, in 10 weeks, a ship that would sink those captured by the South and safeguard the blockade.

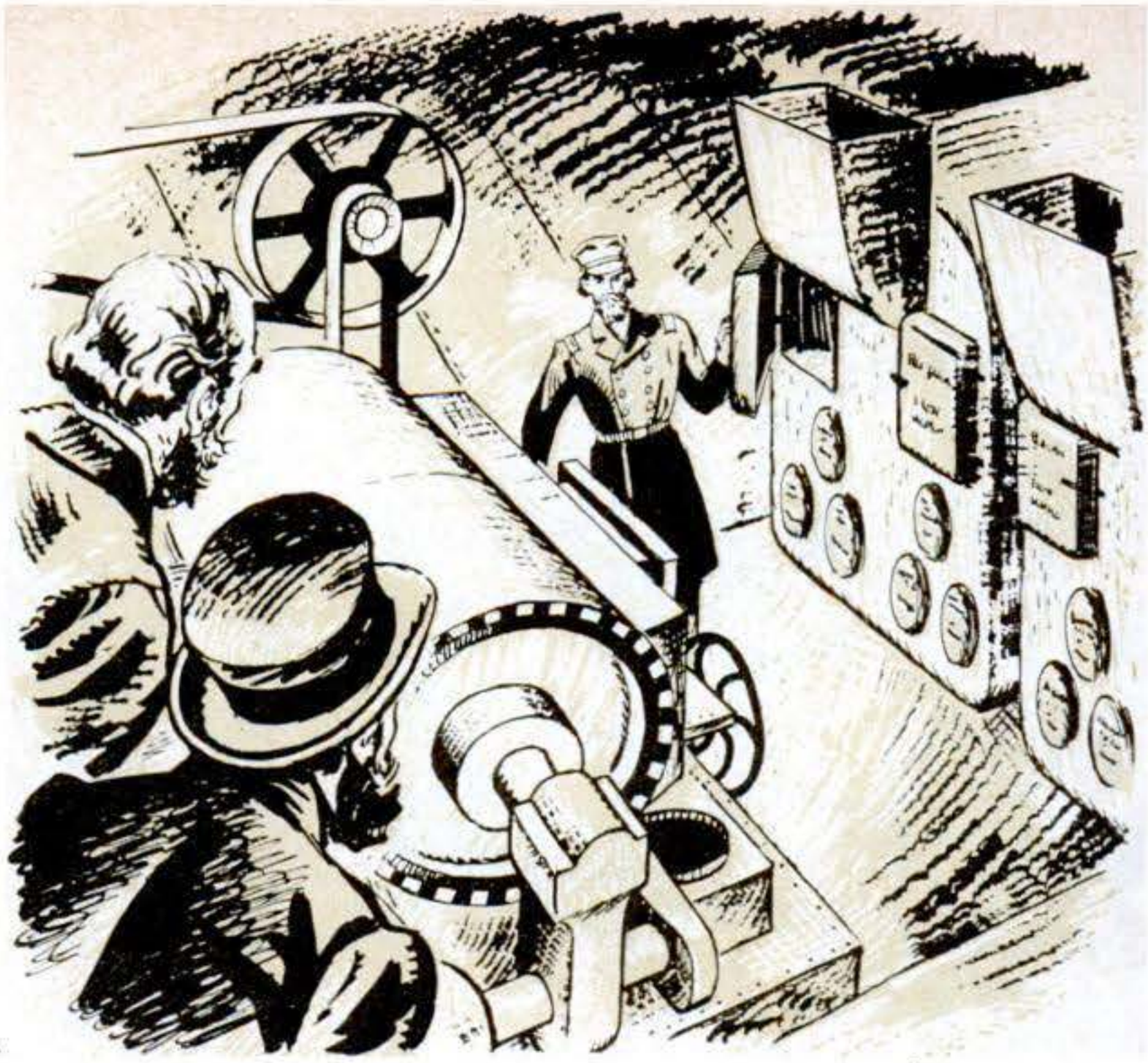
CONTINUED



Copyrighted material

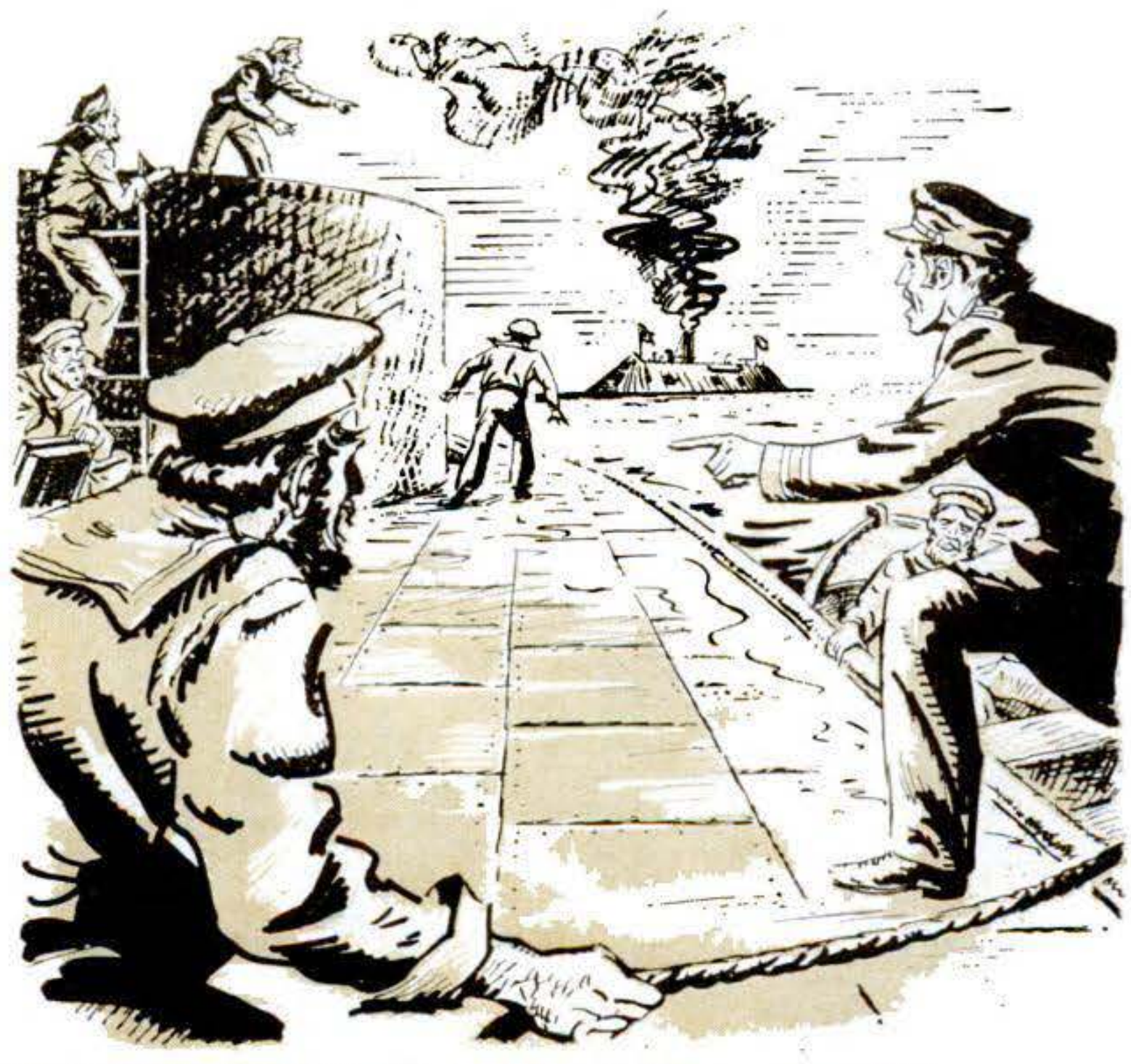


**PLANS ARE SHOWN** The letter went unanswered, but a friend, Cornelius Bushnell, to whom Ericsson showed a model of the design, took it to Lincoln. The President convened the Ironclad Board to consider the idea, saying he knew little about ships "except flatboats, but this one seems flat enough," and "I think there's something in it." But only when Ericsson himself came did he get grudging approval from the board.



**OCTOBER 1861** Work began at Greenpoint, Long Island, on Oct. 25. The 400-hp. engine had two cylinders, of 36-inch bore and 27-inch stroke, in a single casting crosswise of the hull. Bell cranks, 90 degrees apart to overcome dead center, were coupled to a single crankpin on the shaft. The four-bladed propeller was nine feet in diameter. Two boilers, located forward of the engine, were fed air by steam-driven blowers.

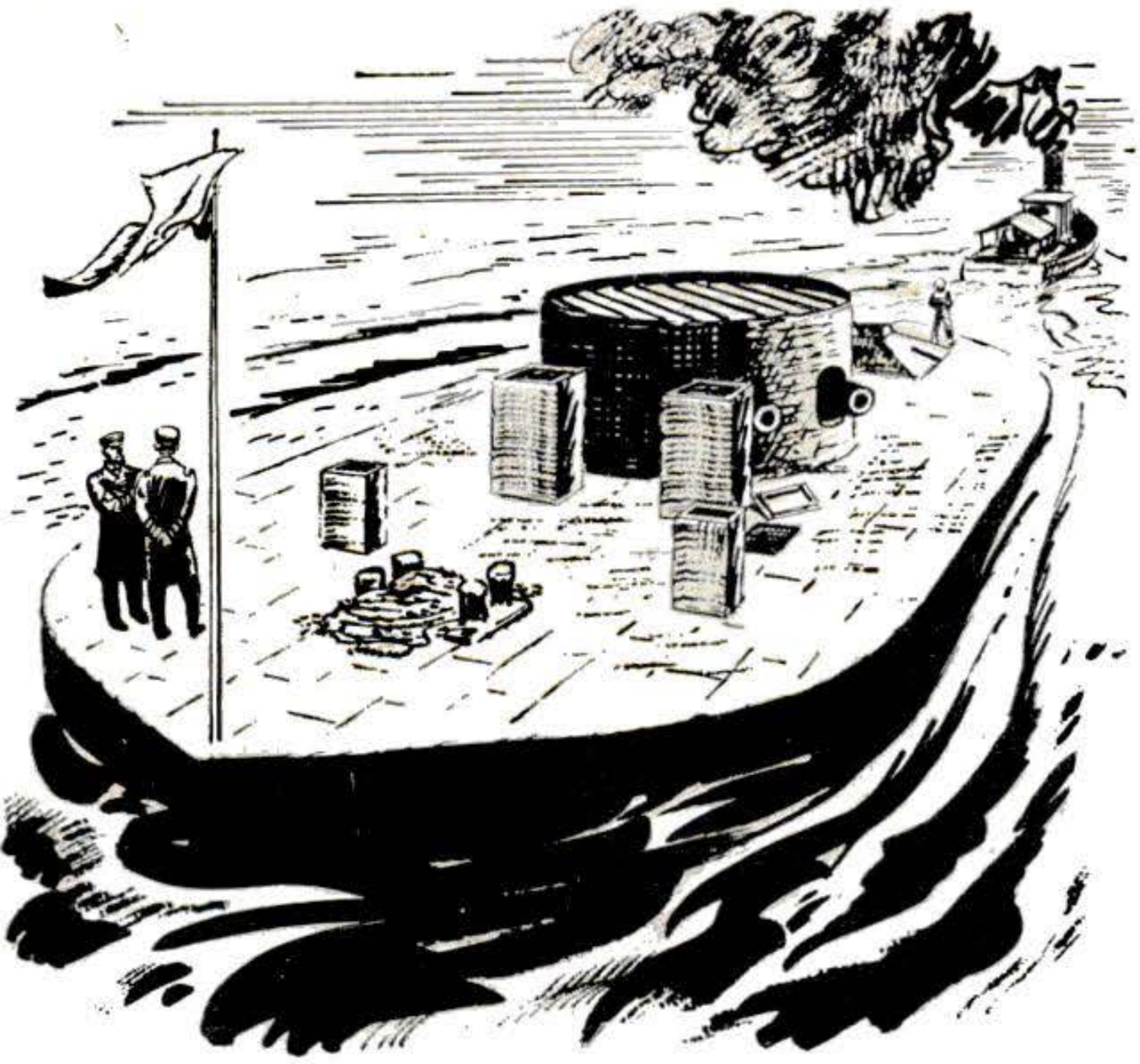
**MARCH 8, 1862** Running unharmed past the U. S. frigate Congress, the Merrimac, now renamed the Virginia, poured a hot fire into the U. S. sloop Cumberland, whose cannons had no effect on the ironclad. Then the Virginia rammed. The Cumberland sank with a loss of 121 men. Little damaged, the Virginia next shelled and burned the Congress, killing 136. A 14-year-old telegrapher saw the fight, flashed the news out.



**ENEMY SIGHTED** On picking up a pilot that night, the Monitor heard of the disaster. Arriving at Hampton Roads about nine p.m., Worden was ordered to assist the U. S. frigate Minnesota, grounded a mile from Newport News. She could not be freed. At 7:30 next morning, March 9, the Virginia was seen approaching. Worden hastily got the Monitor under way to engage the enemy as far from the Minnesota as possible.



Copyrighted material



**AN ERA IS BORN** Many doubted that the iron monster would float. But Ericsson, with others, stood on the deck as it slid into the water on Jan. 30, 1862. Work continued day and night to finish it, for the blockade situation was desperate. Poor valve setting and an overbalanced rudder were hastily remedied. On March 6, the Monitor, with a crew of 61 under Lt. John Worden, headed south, towed by a tug.

**STORMY PASSAGE** At noon of the next day, strong winds and rough seas forced water under the turret and through hawsepipes. As waves broke over the four-foot blower stacks, water made the blower belts slip and finally break. Fumes filled the engine room. Men struggling to make repairs were carried out almost asphyxiated. The tiller ropes tangled, making the ship unmanageable. Only a timely calm saved her.

**BATTLE JOINED** Two 11-inch smoothbore guns in the turret, firing solid 168-pound shot, ripped iron freely off the Virginia. They could have done more had regulations not limited the powder charge to 15 pounds. The turret, a nine-foot-cylinder with walls eight inches thick, was seated on a bronze deck ring and turned by steam. Huge port stoppers had to be hoisted up each time one of the turret guns was fired.

**DAVID AND GOLIATH** For two hours the battle went on, the little Monitor ranging like a terrier about the bigger ship, her two rotating guns against the Virginia's ten fixed ones. Dodging the ironclad's attempt to ram her, she tried to disable the Virginia's rudder. At times the ships were only feet apart. At 11 a.m. Worden withdrew temporarily from the battle to hoist a fresh supply of ammunition into the gun turret.

CONTINUED



Copyrighted material

**A CRUCIAL HIT** Meanwhile, the Virginia attacked the Minnesota, with little effect. The Monitor, though communication with the pilot was poor and the gunners lost orientation in the rotating turret, returned to the fight. About noon, with the ships only 10 yards apart, a shot struck one of the iron blocks of the pilot house. Blinded by fragments, Worden thought the damage serious, gave his crew orders to sheer off.

**BATTLE'S END** The roof of the pilot house had been knocked askew, letting in light that made Worden believe the damage greater than it was. The Virginia also withdrew. Lt. S. D. Greene, second in command, gave up a chase because the pilot house prevented firing directly ahead. The Monitor's turret had proved its worth: From its two guns the Virginia sustained 50 hits, but her 10 guns had struck the Monitor only 21 times.

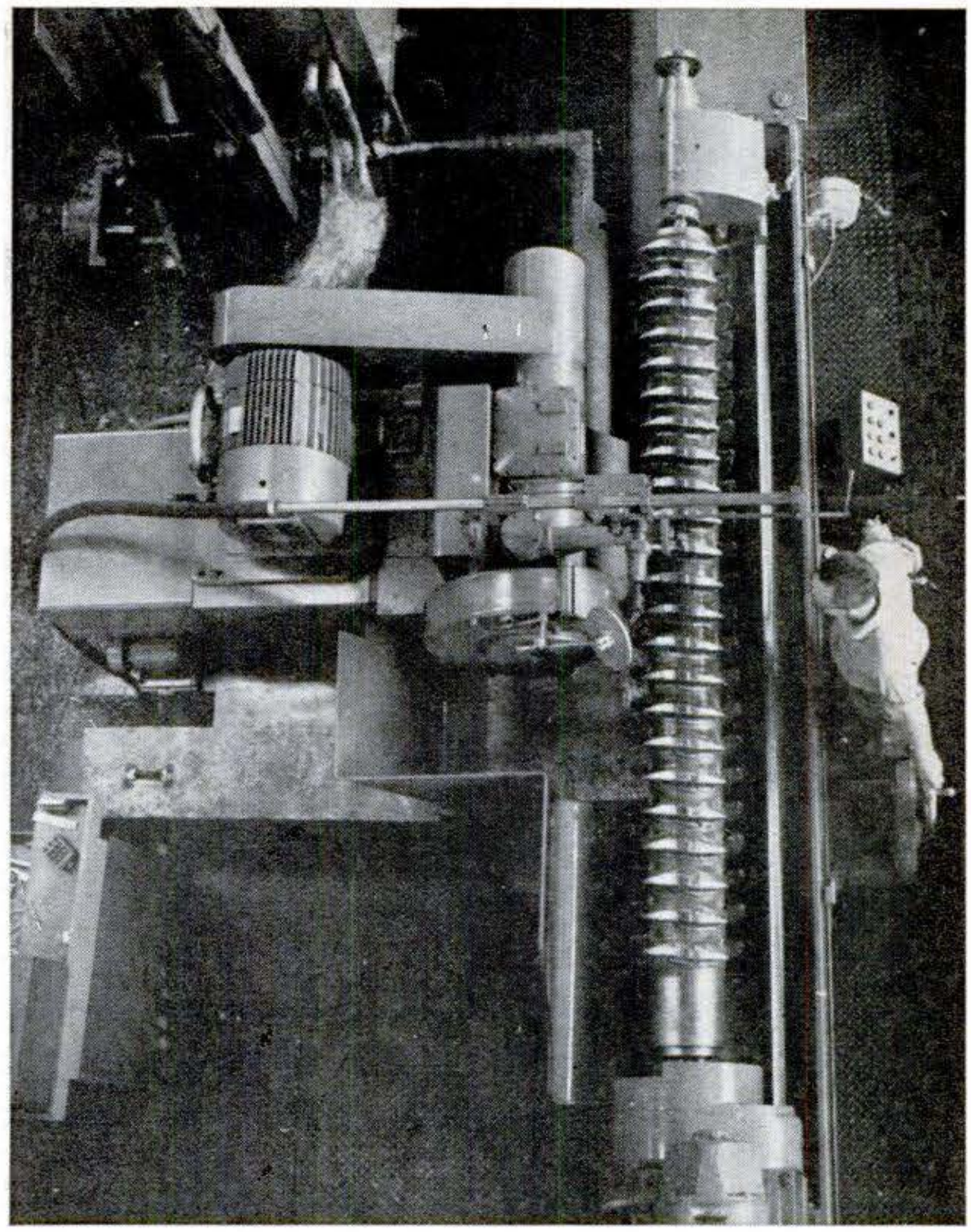
**DECEMBER 31, 1862** While being towed by the Rhode Island off Cape Hatteras, the Monitor met a hurricane. The ship plunged under 40-foot waves. Two feet of water swirled in the wardroom. At 11 p.m. she flew distress signals. Two boatloads were taken off, but the Monitor sank with 16 men. Small and barely seaworthy, she had saved the day for the Union—and sunk for all time the world's proud wooden navies.



Copyrighted material

## Bus-seat indicator

Double-decker buses in Liverpool, England, have an electric panel at the entrance that indicates empty seats on the upper level, where standing is prohibited. It saves passengers from a vain climb and avoids congestion on the stairs. A microswitch in each upper-deck seat is operated by the weight of its passenger. It extinguishes the corresponding light on the panel when sat upon.



## Giant grinder

This is how a new roll grinder, resembling a lathe, would look to a bird perched in the rafters of the Baker Perkins, Inc., machine shop in Saginaw, Mich., where it's installed. It handles diameters from 1 to 24 inches, lengths up to 10 feet.

In slot, jacket off . . .

. . . picked up by edges . . .

. . . placed on turntable.

## Newest slot machine

A padded slot in the front of new GE stereo consoles and two stereo portables enables you to place records on the turntable without leaving greasy fingerprints on the sound grooves. You pick the record up by its jacket, stick it in the slot, remove the jacket, and then do the rest of the handling by the edges.



Copyrighted material

**POPULAR SCIENCE here presents the third article in its winter series on the 1961 crop of compact cars. In January we reported on 10,000 miles of driving in the Olds F-85; in February, on 10,000 miles in the Pontiac Tempest.**

**Now we can summarize the virtues and demerits found in the spirited new Dodge compact, the Lancer. This car, a fancied-up brother to the Plymouth Valiant, was also driven 10,000 miles—the equivalent of a year's service—**

# Testing the New Little Dodge: 10,000

**By Devon Francis**

THE first editions of U. S. compact cars, introduced a year and a half ago, had fairly small engines. The cars were fairly economical to run. Their performance was somewhat tepid.

Inevitably, the major manufacturers have begun to break the pattern. The Dodge Lancer is compact, all right. Its normal engine size is within acceptable limits. But from there on, any resemblance between the optional Lancers you can order and the first-generation compacts is purely coincidental.

In the version that POPULAR SCIENCE bought, the Lancer is a bomb—and it's *not* economical of gas. It couldn't be, with the transmission, engine, and axle ratio chosen. To satisfy our curiosity as to what a souped-up version of a compact would do, we sacrificed economy to

## HOW THE LANCER DID

### THE PERFORMANCE

| | |
|---|---|
| Total distance covered | 10,017.1 miles |
| Gasoline used (non-premium) | 614.5 gal. |
| Average miles per gallon | 16.3 |
| Oil burned | 4 qts. |
| Gas mileage at constant speeds | |
| 30 m.p.h. | 21.8 |
| 40 m.p.h. | 20.8 |
| 50 m.p.h. | 18.4 |
| 60 m.p.h. | 16.1 |
| Gas mileage in stop-and-go driving | 13.8 |
| Acceleration | |
| 0-60 m.p.h. | 11.2 seconds |
| 40-60 m.p.h. | 5.5 seconds |
| 50-70 m.p.h. | 7 seconds |
| Top speed | 92 m.p.h. |
| Speedometer error | |
| Indicated Speed / Actual Speed | |
| 40 m.p.h. | 39 m.p.h. |
| 50 m.p.h. | 49 m.p.h. |
| 60 m.p.h. | 58 m.p.h. |
| 70 m.p.h. | 68 m.p.h. |

### THE COSTS

| | | |
|---|---|---|
| Gasoline | | $201.55 |
| Oil burned | | 1.60 |
| Gas-oil cost per mile | | .0203 |
| Repair and maintenance, including adjustments at 500, 1,000, 5,000, and 10,000 miles | | |
| Oil and filter changes | $12.00 | |
| Lubrication | 6.00 | |
| Tune-up (parts) | 12.50 | |
| Total labor | 14.50 | |
| Total | | $45.00 |
| Overall direct operating cost per mile | | $.0246 |



Copyrighted material

**in one month. The story of how it stood up starts below.**

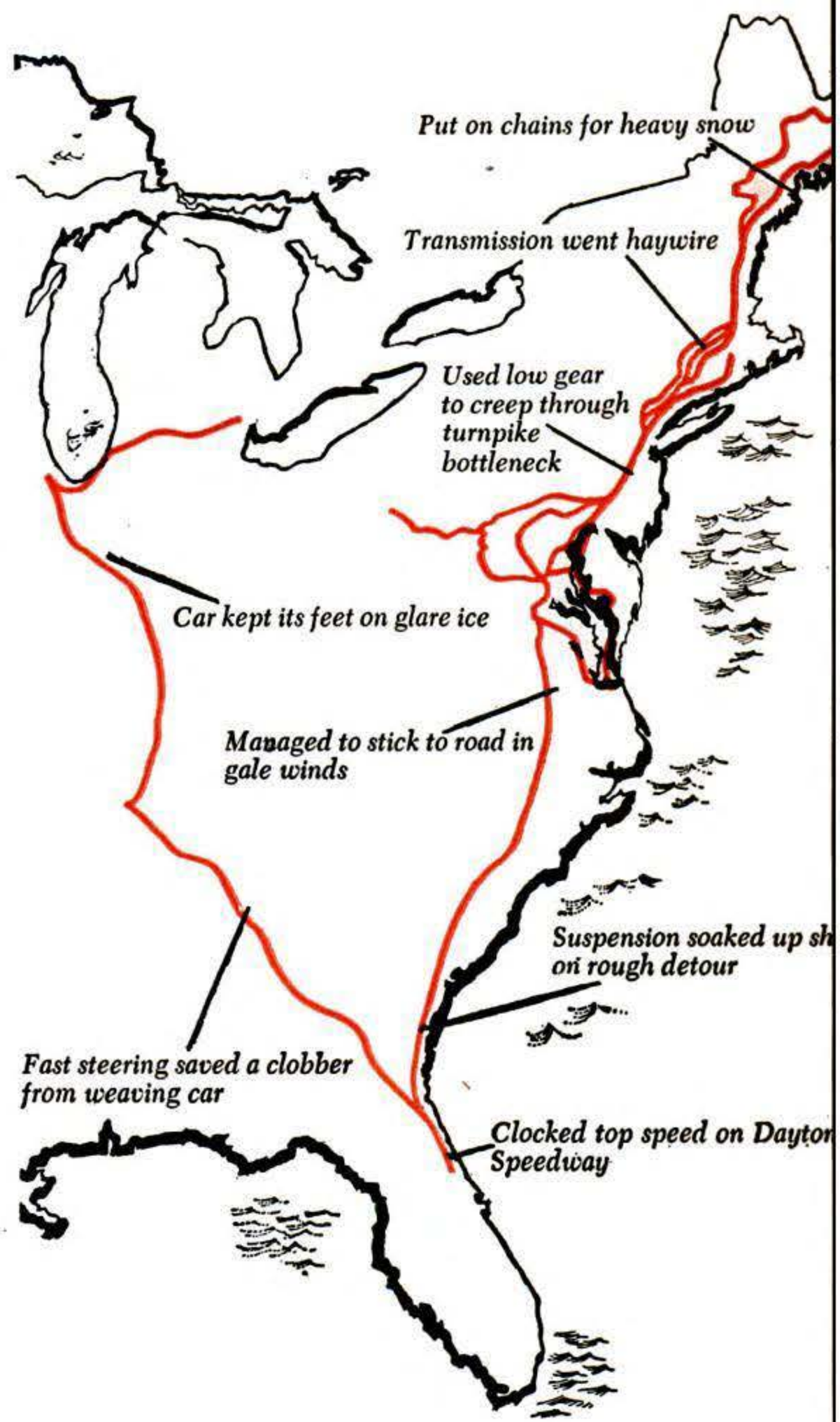
**The Lancer was purchased at its full retail price ($2,963 including Michigan sales tax) from a regular dealer. It was a four-door wagon, with heater, radio, outside mirror, and windshield washers as accessories. Unlike the five previous test cars, however, it was "loaded." It had the optional 225-cubic-inch engine, a three-speed automatic transmission, power steering, and a hot 3.9 rear axle.**

# Miles in a Lancer

performance. Needless to say, the Lancer *does* come in mechanical renderings that are less eager, less boisterous, and a lot easier on fuel.

A half-dozen staff members drove the Lancer 10,000-odd miles. Their areas of agreement on its general characteristics were large, although minor dissents did crop up. The car developed one bad spavin. It will be described in the following round-table discussion.

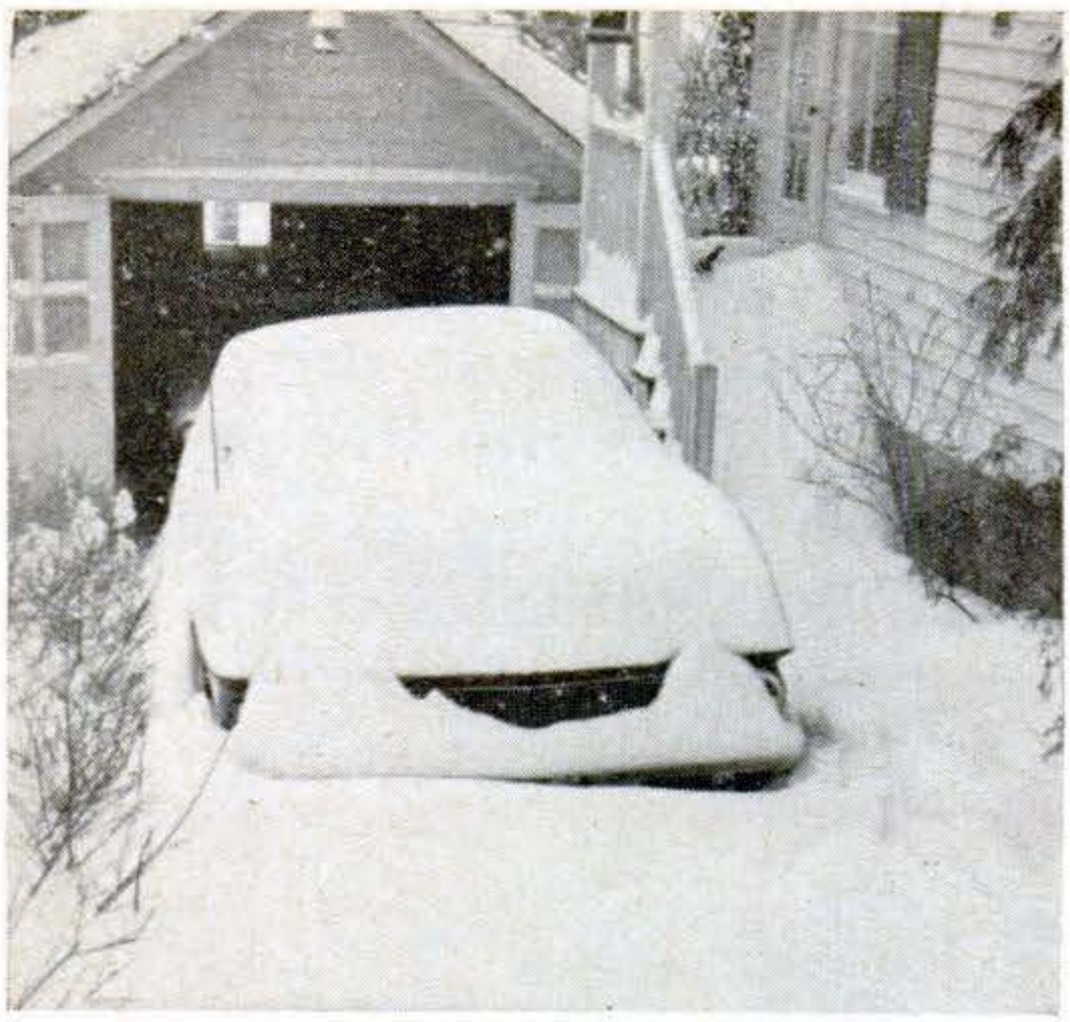
*Lancer's log included 20 miles at sea —a cruise aboard ferry linking the mainland with Virginia's Eastern Shore.*




CONTINUED



Copyrighted material



*How do you average 400 miles a day if 18 inches of snow fall overnight? Answer: with shovel, chains, and urgency.*

*On Daytona track, top speed of car, still stiff at 2,000 miles, was 87 m.p.h. At 6,000, it had loosened up enough to hit 92.*

### Fuel Consumption

Frank Rowsome Jr.: In something more than 1,700 miles, I registered about 16½ miles to the gallon.

Howard Allaway: I got less—14.3 in stop-and-go around town, and 15.7 on the highway.

Ken Fermoyle: Let's bear in mind that this car had the big 225-cubic-inch engine —essentially the one in the Plymouth six. And it had a 3.9:1 "performance" axle.

Rowsome: And consider the conditions. I drove in bitter cold at high speed. For some stretches I had to use chains in heavy snow.

Allaway: I got into slush and ice. Let's also bear in mind that an automatic transmission always costs gas.

### Handling

Al Lees: I kept asking myself, "This is driving?" What with pushbutton transmission and feather-touch steering, all you have to do is aim it. I've never had my hands on a station wagon that caused less sweat in traffic.

Martin Mann: That may well be, but the steering was too fast for me. I never could get my corrections fine enough to maintain a comfortable course down a straight expressway. I suspect this might be dangerous for an inexperienced driver on a slippery road.

Alex Markovich: I'll concede that you have to get used to the steering. If that's a fault, the car has compensating traits. It shows no skittishness in snow. It cor-

### How the Lancer compared with PS's Tempest, F-85, and 1960 Corvair, Falcon, and Valiant

| | Lancer | Tempest | F-85 | Corvair |
|---|---|---|---|---|
| Overall average miles per gallon | 16.3 m.p.g. | 20.25 m.p.g. | 20.21 m.p.g. | 23.43 m.p.g. |
| Gas mileage at constant speeds | | | | |
| 30 m.p.h. | 21.8 m.p.g. | 28.4 m.p.g. | 27.9 m.p.g. | 26.6 m.p.g. |
| 40 m.p.h. | 20.8 m.p.g. | 27 m.p.g. | 26.8 m.p.g. | 24.2 m.p.g. |
| 50 m.p.h. | 18.4 m.p.g. | 24.9 m.p.g. | 24.9 m.p.g. | 23.6 m.p.g. |
| 60 m.p.h. | 16.1 m.p.g. | 22 m.p.g. | 21.6 m.p.g. | 22.6 m.p.g. |
| Miles per gallon in stop-and-go driving | 13.8 m.p.g. | 18.7 m.p.g. | 15.03 m.p.g. | 21 m.p.g. |
| 0-60 acceleration | 11.2 sec. | 13.5 sec. | 13.8 sec. | 17 sec. |
| Top speed | 92 m.p.h. | 96-plus | 100-plus | 88 m.p.h. |
| Total oil consumption | 4 qt. | 1 qt. | 4 qt. | 4 qt. |
| Gas-oil cost per mile | $.0203 | $.0163 | $.0162 | $.0145 |
| Overall direct operating cost per mile | $.0246 | $.0186 | $.0172 | $.0184 |

*NOTE: Lancer bought by PS had optional larger engine, automatic transmission, 3.9*



Copyrighted material

*Slammed along frozen Maine back roads, the Lancer handled well, rarely bottomed.*

ners well. There's practically no body lean in tight turns. The brakes are fine.

Fermoyle: The weight balance is good. The rear wheels stick to the pavement like egg yolk to a plate. Personally, I like the fast steering. At one point, when another car cut in front of me, it saved me from trouble.

Allaway: To me the Lancer was not only quick but sure-footed—as if running in sneakers.

Rowsome: That's how I felt. Even on rough roads, going too fast, it kept its feet. When you do get it going a little sideways, it wants very much to straighten up. As for the steering, it's unquestionably nutty to have power steering in a comparatively light car like this. But I like the quicker ratio that is fitted with power on Chrysler-built cars.

**How the Lancer's Tires Stood Up**

At 11,040 miles, a tire expert measured the Lancer's 6.50 x 13 Goodyear tires. He found that just a shade less than 30 percent of the tread had been worn off the front tires and a full 30 percent off the rear ones. The four tires had been rotated at 5,105 miles. The spare had not been used. On that basis, four tires would have lasted for 30,000 miles, and five for 37,500.

### *The Ride*

Fermoyle: I prefer a ride that's a little stiff rather than soft. The Lancer's suited me fine. There's a little bit of pitching on wavy, choppy surfaces.

Markovich: The shocks are firm. They

CONTINUED

| Falcon | Valiant |
|---|---|
| 26.56 m.p.g. | 20.31 m.p.g. |
| | |
| 30.2 m.p.g. | 25.8 m.p.g. |
| 29 m.p.g. | 24.2 m.p.g. |
| 28.1 m.p.g. | 23.9 m.p.g. |
| 27.1 m.p.g. | 22 m.p.g. |
| 22.4 m.p.g. | 19.6 m.p.g. |
| 22.9 sec. | 17 sec. |
| 78 m.p.h. | 96 m.p.h. |
| 1 qt. | 3 qt. |
| $.0122 | $.0163 |
| $.0147 | $.0206 |

*"performance" rear axle.*

*Wagon felt sure-footed on snowy or icy roads. Partially completed Pittsburgh Auditorium is in background.*

## How the Same Lancer Performed with a Standard Rear Axle

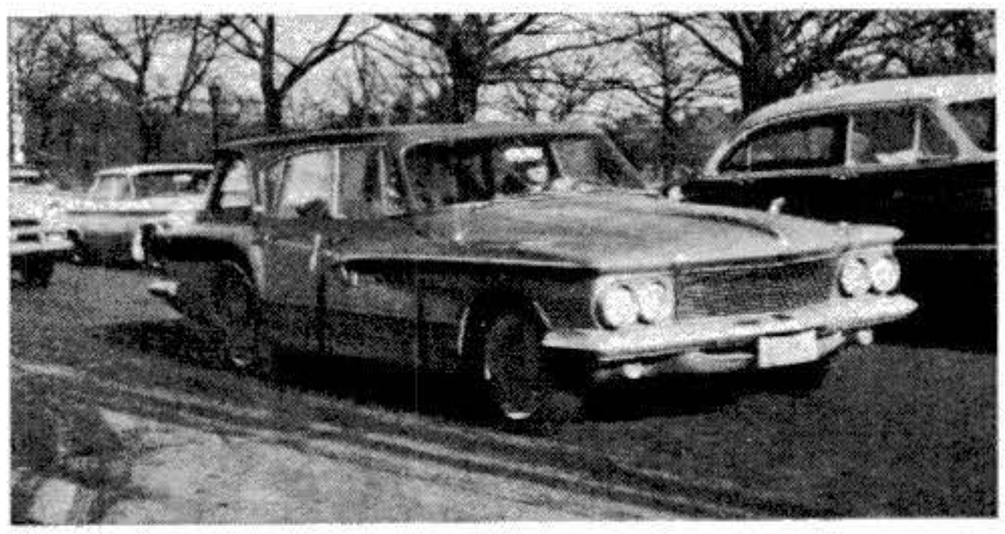
After completing the 10,000-mile test run in the Dodge Lancer with its special factory-fitted 3.9:1 "performance" rear axle, PS wondered how the car would have behaved with less jack-rabbity gearing. So we changed it to a 3.23:1 gear.

This change of roughly 20 percent brought the car to the area of normal gearing, but it was in no sense extreme. A 3.23 axle in a comparatively light car with a 225-inch engine is hardly undergeared.

We then drove the car an additional 1,276 miles, remeasuring performance and fuel consumption. Here are the results:

Psychologically, the way the car felt after the change depended on recent experience with the high-performance axle. Those who had put on high mileage with the "hot" gear felt at first that the car had become sluggish. After an hour or two the impression faded. Correspondingly, those accustomed to the earlier ratio felt that the engine and transmission had become much smoother. Starts from a stop were more pleasing.

Consensus of the drivers who had experience with both axle ratios: Except for people who travel hilly country with heavy loads, or who have an acute need for jazzy acceleration, the 3.23 axle makes



far more sense in this car when equipped with this engine and transmission.

By stopwatch, the change brought these differences in performance:

| | *3.9 Axle* | *3.23 Axle* |
|---|---|---|
| 0-60 m.p.h. | 11.2 sec. | 15 sec. |
| 40-60 m.p.h. | 6.5 sec. | 8.2 sec. |
| 50-70 m.p.h. | 8 sec. | 12 sec. |
| Top speed | 92 m.p.h. | 100+ m.p.h. |

In miles per gallon of fuel, the ratio change produced these results:

| | *3.9 Axle* | *3.23 Axle* |
|---|---|---|
| Constant 30 m.p.h. | 21.8 | 26.4 |
| Constant 40 m.p.h. | 20.8 | 24 |
| Constant 50 m.p.h. | 18.4 | 21.7 |
| Constant 60 m.p.h. | 16.1 | 19.6 |
| Stop-and-go driving | 13.8 | 15.7 |
| Over-all gas mileage | 16.3 | 19.2 |

give you a pretty smooth ride over any type of road.

Mann: The ride is comfortable—and in the back seat, too, according to my kids. But on a certain combination of wavy blacktop and 65-m.p.h. speed, there's a weird diagonal rocking. The front end dives over on one wheel and then the other.

Rowsome: That didn't show up for me. I found the ride delightful on horrible roads, on holes, wallows, ruts, and loose stones. It's just a bit thuddy on medium-fair roads.

Allaway: The ride's as good as the F-85's and far superior to the Tempest's.

### Performance

Markovich: There's lots of torque.

Rowsome: There's an understatement for you. The car's a tire-chirper.

Markovich: As I was about to add, the acceleration is great in all speed ranges. The standing-start acceleration is terrific, especially when you shift 1-2-D on the buttons.

Rowsome: This particular axle and

[Continued on page 234]

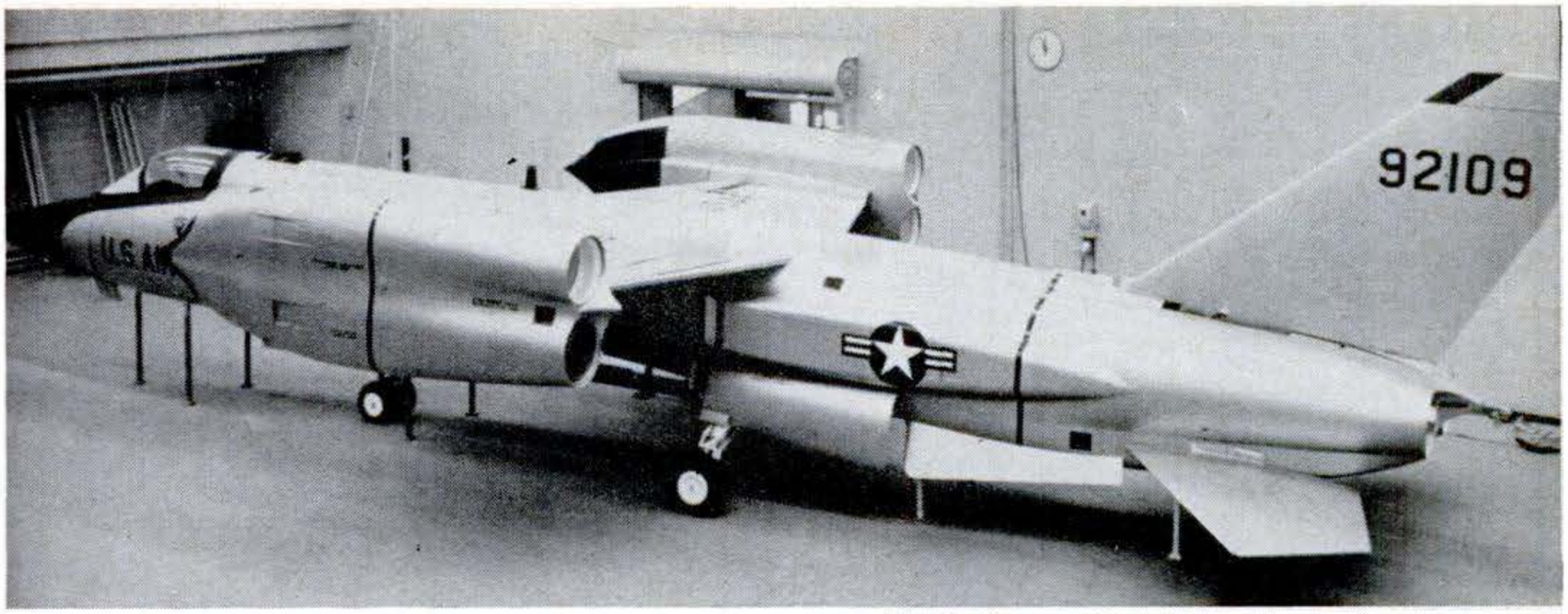
### How Well Was It Designed and Built?

Despite its corporate kinship and styling, the Dodge Lancer is not a Plymouth Valiant in different dress. It has a character of its own. First and foremost, it's better built. But like all cars, it has its faults. Here are some:

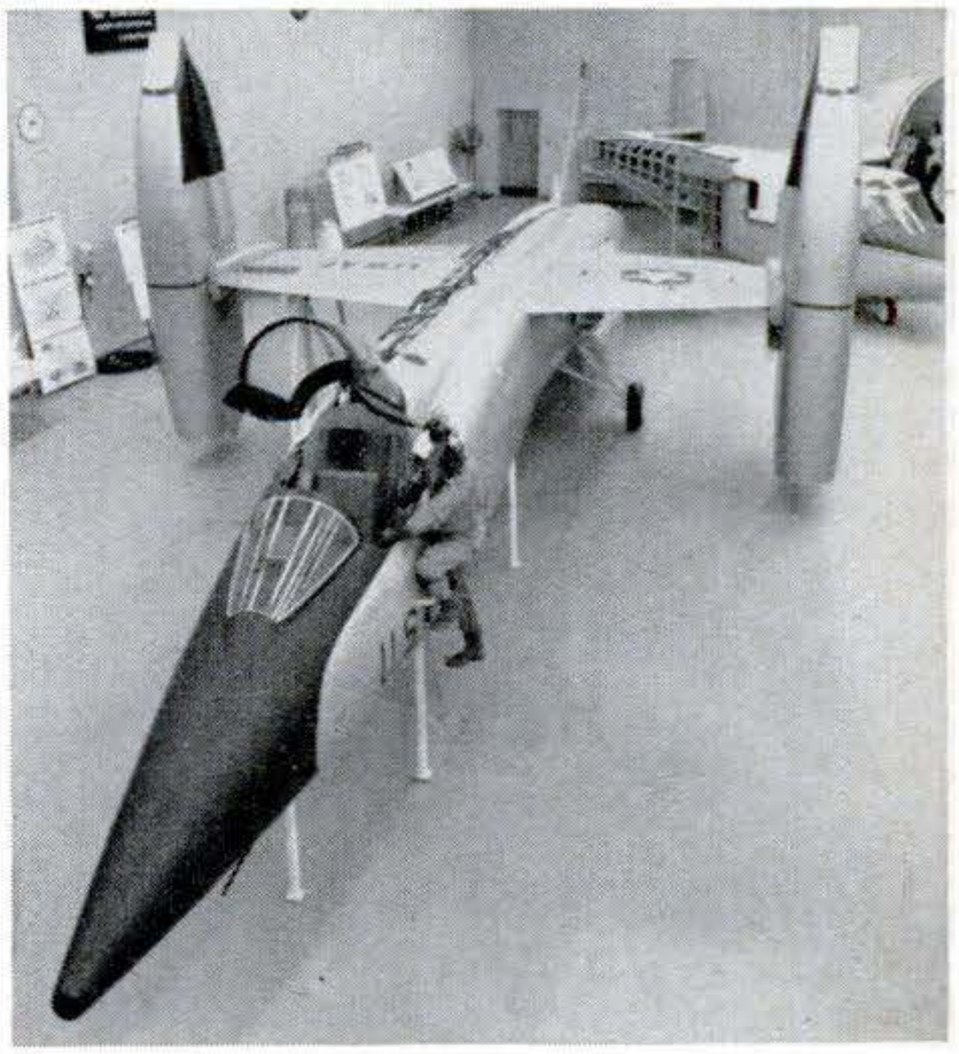
- The automatic transmission had to be repaired after 5,000 miles, apparently because it had not been tailored to a high-performance axle. Moreover, it refused to upshift when stone-cold.
- The gas capacity is too low. A 500-mile day required three refuelings.
- The rear roof overhang sucked up muck on the tailgate glass.
- The ash tray is poorly designed and awkwardly placed for the driver. At night, panel lights reflect in the windshield.
- Certain vent-window settings caused a wind whine at high speeds.
- A secondary park lock failed to work under roll-back loads.
- Finally, the station-wagon body seemed to be slightly too limber.



Copyrighted material




Wing jets turned for horizontal flight . . .
. . . in position for vertical takeoff.



## Eight-jet fighter-bomber can take off from a dime

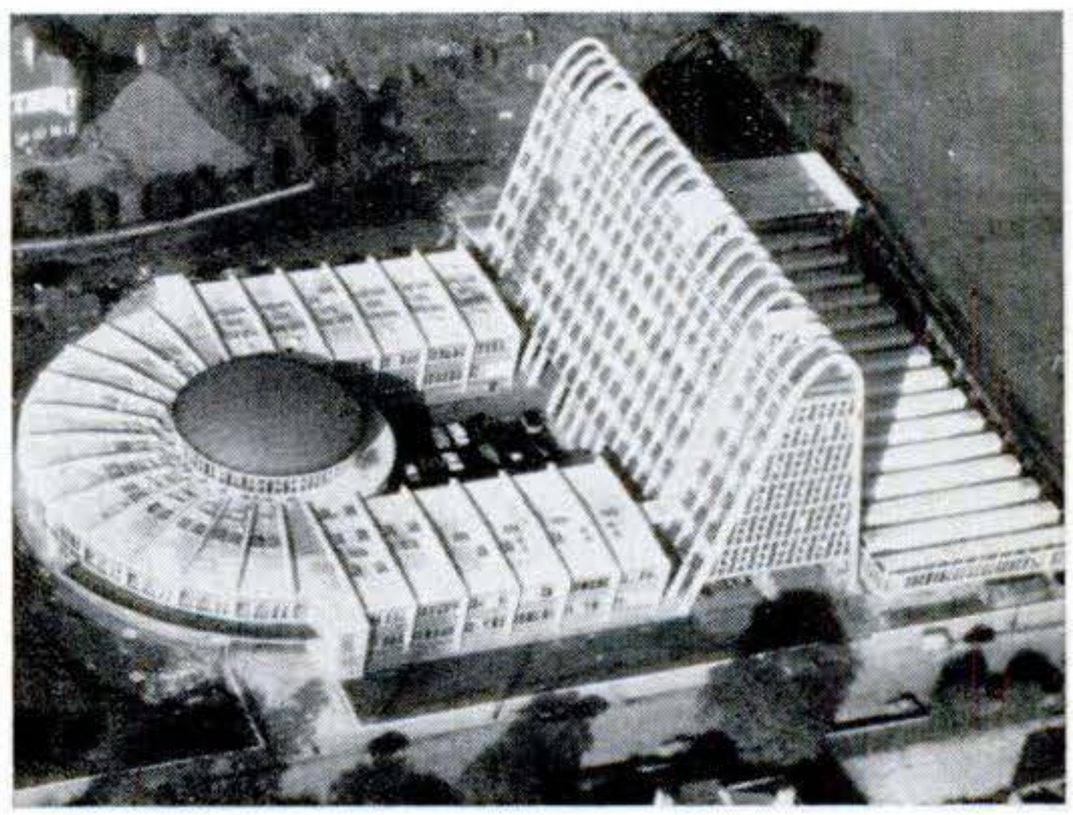
The Air Force and Navy may soon have a supersonic fighter-bomber that can take off from, and land on, a helicopter landing pad.

The single-place VTOL Bell D188A is designed for eight turbojets: two that rotate at the end of each short, knifelike wing, two in fixed horizontal position in the tail, and two set vertically through the fuselage behind the cockpit, covered by flaps when not in use.

The plane would reach an altitude of 61,000 feet in 60 seconds, attain a speed of Mach 2.3, more than twice that of sound. A full-scale mock-up has been built under contract.

### Big load for little wagon

Britain's Austin and Morris 850 station wagons may be only 11 feet long, but their 35½-cubic-foot cargo compartments can hold a lot of freight. By actual count, this one held a trunk, 12 suitcases, a picnic table, 9 folding chairs and stools, a baby carriage, and other odds and ends. The battery and spare wheel are recessed under the floor.

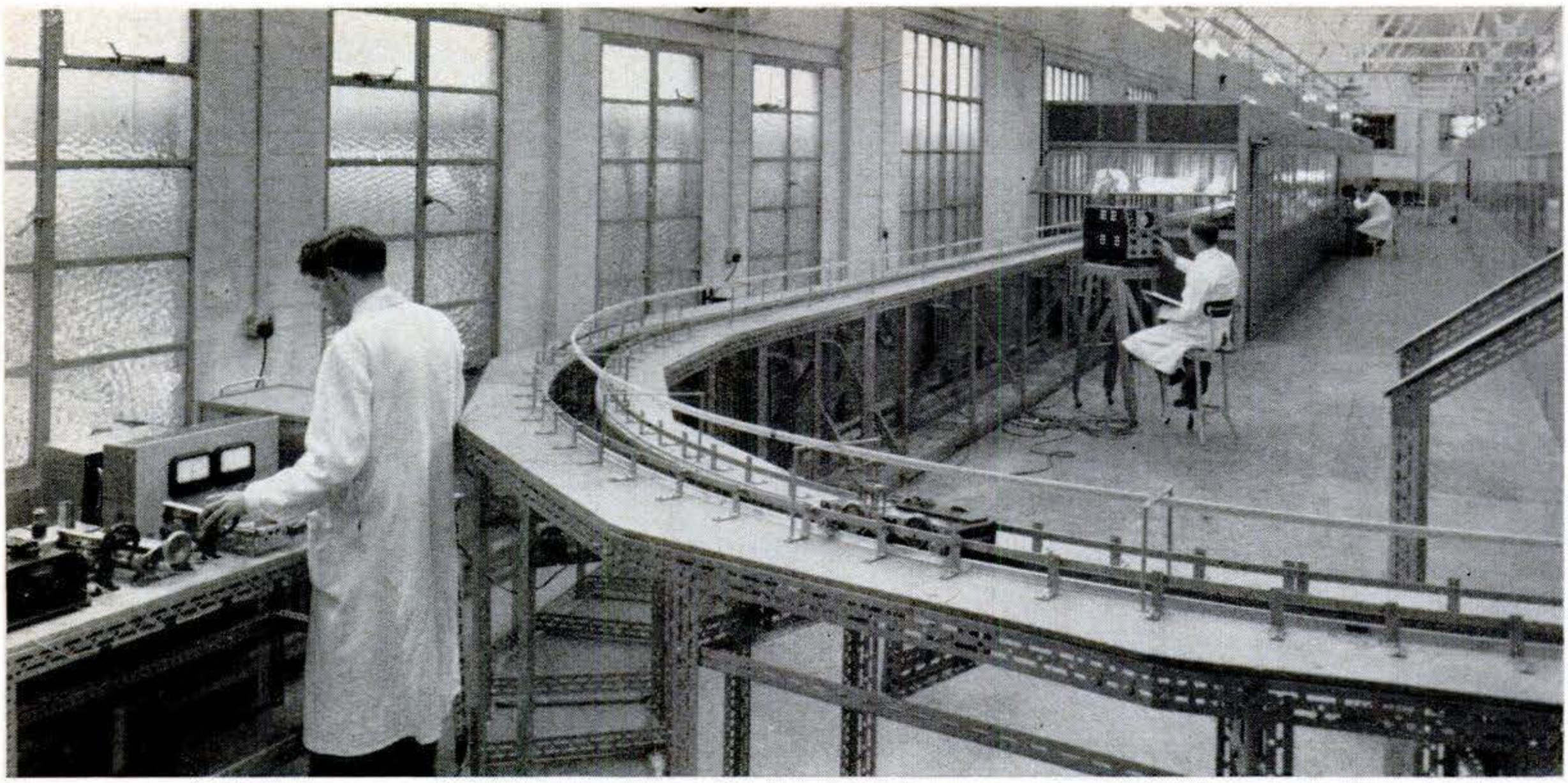


### Designed for learning

This spectacular group of buildings is the new Domestic and Trades College at Manchester, England. The college, built at a cost of $1,680,000, combines under one roof departments previously scattered about the city in five buildings. Trades as diverse as baking and wigmaking are taught. There is a restaurant in which student chefs test their dishes.



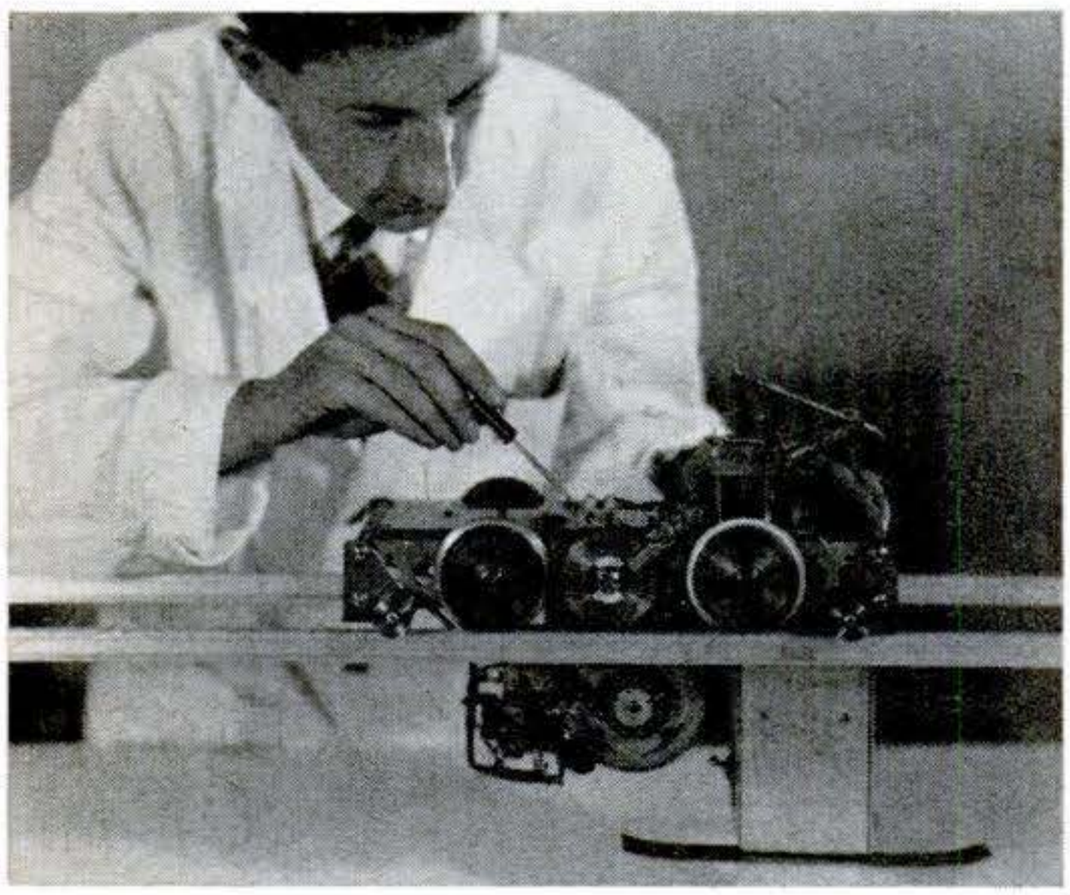
Copyrighted material



**MODEL TRACK** has two test sections housed in temperature-controlled enclosures located along the 80-foot straights. Track uses 5/8" flanged aluminum rails mounted on a steel structure four feet high. Different overhead-wire systems can be installed in each test section for comparative study. Pantograph rides against nylon bar outside the test sections.

# Model Trains Show How to Build Big Electrics

MODEL electric trains scooting around a track at a scale speed of 100 m.p.h. are showing English train designers how to build big electric trains that will never get caught with their pantographs down. One big problem: feeding juice from an overhead trolley wire 16 to 25 feet above the tracks to a locomotive traveling at high speed.



**LOCOMOTIVE** doesn't look much like the real thing, but the dynamic behavior of the critical parts is exactly duplicated. It is powered by a 50-volt DC motor, underslung to give stability. Speed, acceleration, and braking can be regulated automatically by the long curved shoe that operates microswitches placed underneath the track at appropriate locations.

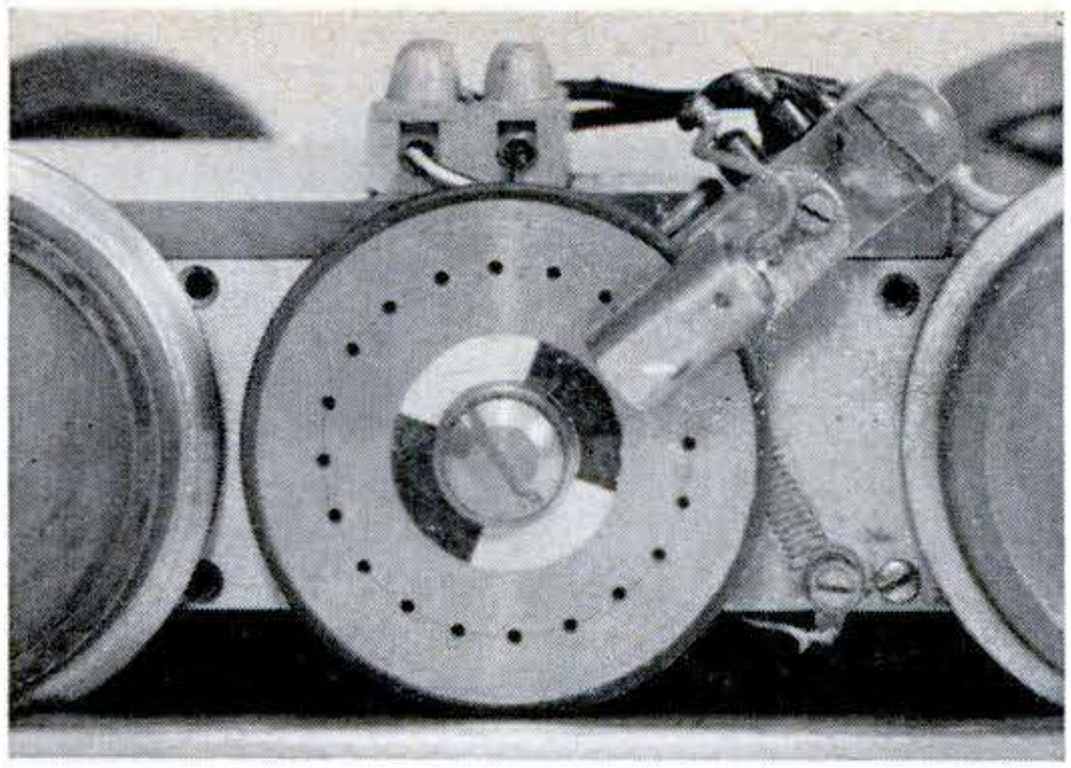
Part of the problem is the pantograph, alternately shrinking and stretching to keep the shoe in contact with the wire.

- It must be light, to keep inertia effects to a minimum.
- It must be strong, to resist high wind pressures and stresses due to the sway of the locomotive.
- It must be flexible. The effect, when the wire changes height to go under an overpass, is comparable to hitting a sharp rise or dip in the highway when you're driving your car at high speed.

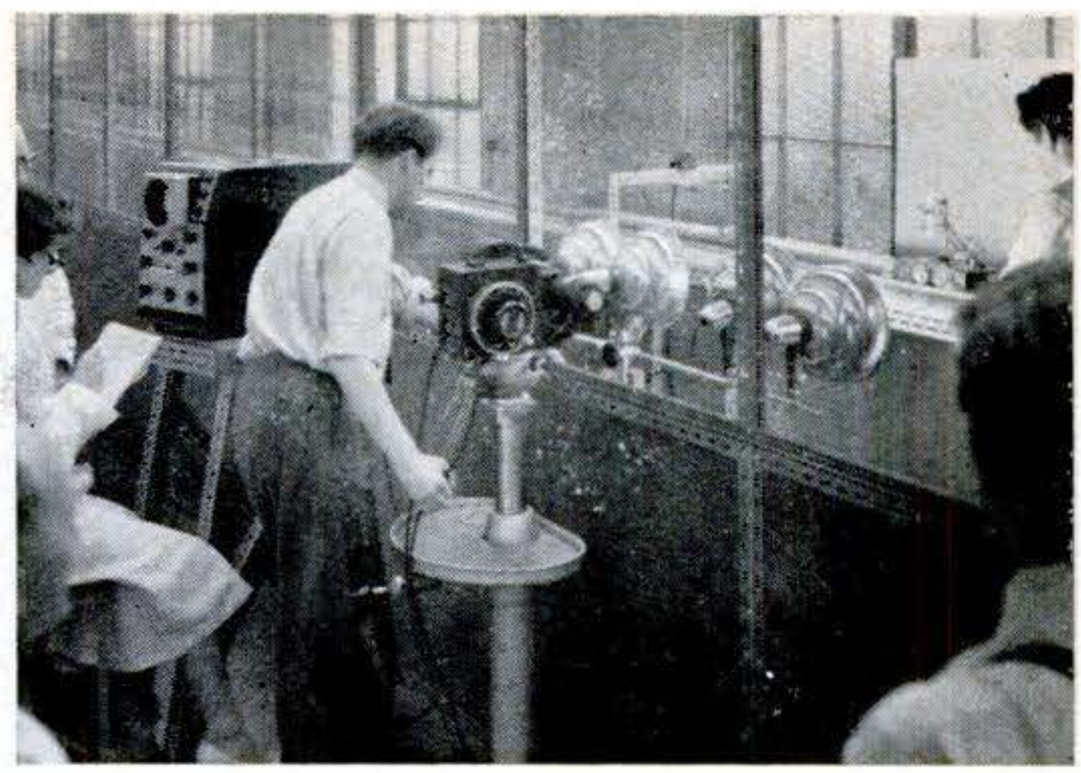
If the contact shoe leaves the wire, or bounces several times as your car wheels usually do, destructive, high-current arcs occur that can quickly destroy both shoe and wire. Besides these big bumps, every point of support for the trolley wire makes a "hard" place that acts like a bump to the shoe pressing against the wire. And there's the wire itself: It sags between supports, so that its own flexibility and inertia must become major



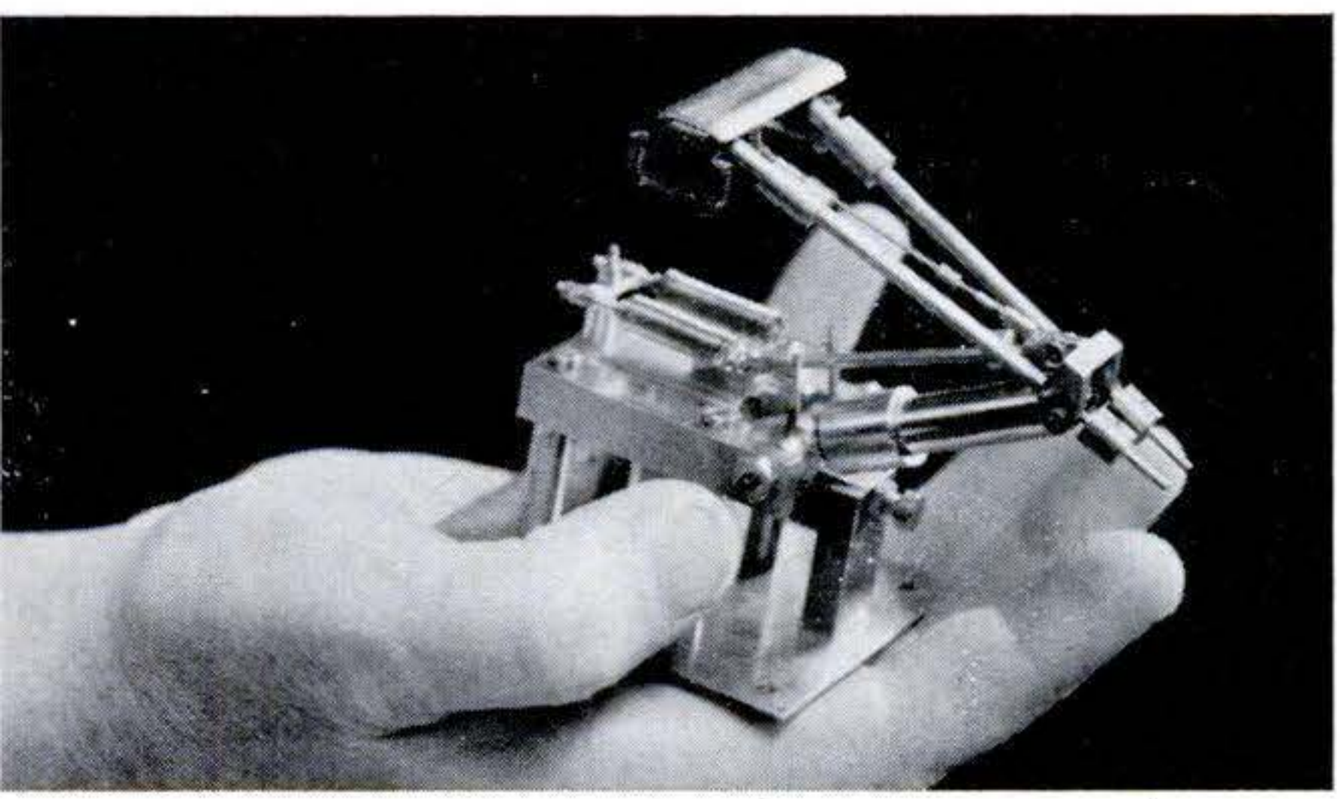
Copyrighted material



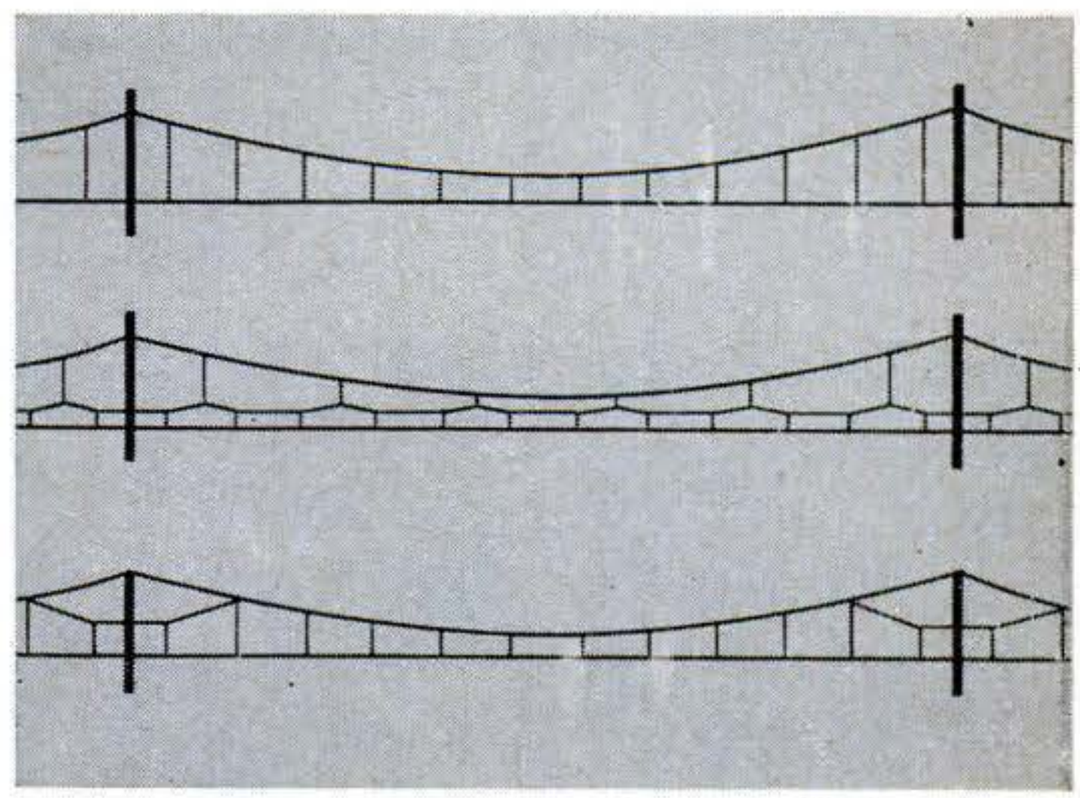
**RUBBER-RIMMED FIFTH WHEEL** measures the locomotive's speed. Light shining through the evenly spaced holes drilled through its rim falls on a photocell. The frequency of the resulting electrical pulses is proportional to speed. Pulses are radioed to a control panel where they operate a meter calibrated in feet per second. Another meter reads acceleration.



**HIGH-SPEED MOVIE CAMERA** at the control point records wire tremors and pantograph behavior as the locomotive races by. Electrical data signals received by radio and wire are displayed on a multitrace oscilloscope. A capacity pickup on the bridge over the track detects wire vibration. Enclosure permits observation under precisely controlled conditions.



**MODEL PANTOGRAPH** is an accurate scale reproduction of the collector assembly used on the British Railways 25-kv., AC system. Although tension of the springs varies with extension, special linkages give constant upward pressure of shoe against wire regardless of wire height. The model serves only for mechanical studies —it receives its power through the rails.



**OVERHEAD WIRES** are made up of tiny brass beads strung on fine wire to keep the correct scaled-down balance between mass and flexibility. Model support is also mathematically scaled—even its stiffness and distribution of mass. The sketches above show various suspension configurations typical of those being investigated by means of the model-railroad setup.

design elements in the complete system.

Housed in a special laboratory at Tolworth, England, is a precision model railroad, used by British Insulated Callender's Cables to study overhead-wire systems. All critical parts are accurately scaled for length, mass, and pressure to give test-bench reproduction, under controlled conditions, of actual-size running.

Scaling ratio for length is 32.5:1, so the 332-foot track loop is effectively more than two miles long.

The ratio for speed is 5.7:1, making the 18-m.p.h. top speed equal to an actual train speed of 100 m.p.h.

The mechanical functioning of the pantograph is faithfully reproduced in miniature. Spring tensions, inertia, and center of gravity of each arm and contact shoe are exactly proportioned to duplicate the behavior of the real thing.

Overhead wires were the most difficult to produce, since the scaled-down balance between mass and flexibility had to be kept. The final solution was to thread cylindrical brass beads on fine brass wire. It takes a workman a full day to make one six-foot section. The catenary wires that support the trolley wire are of similar construction except that tungsten was used instead of brass wire.—*David Scott.*



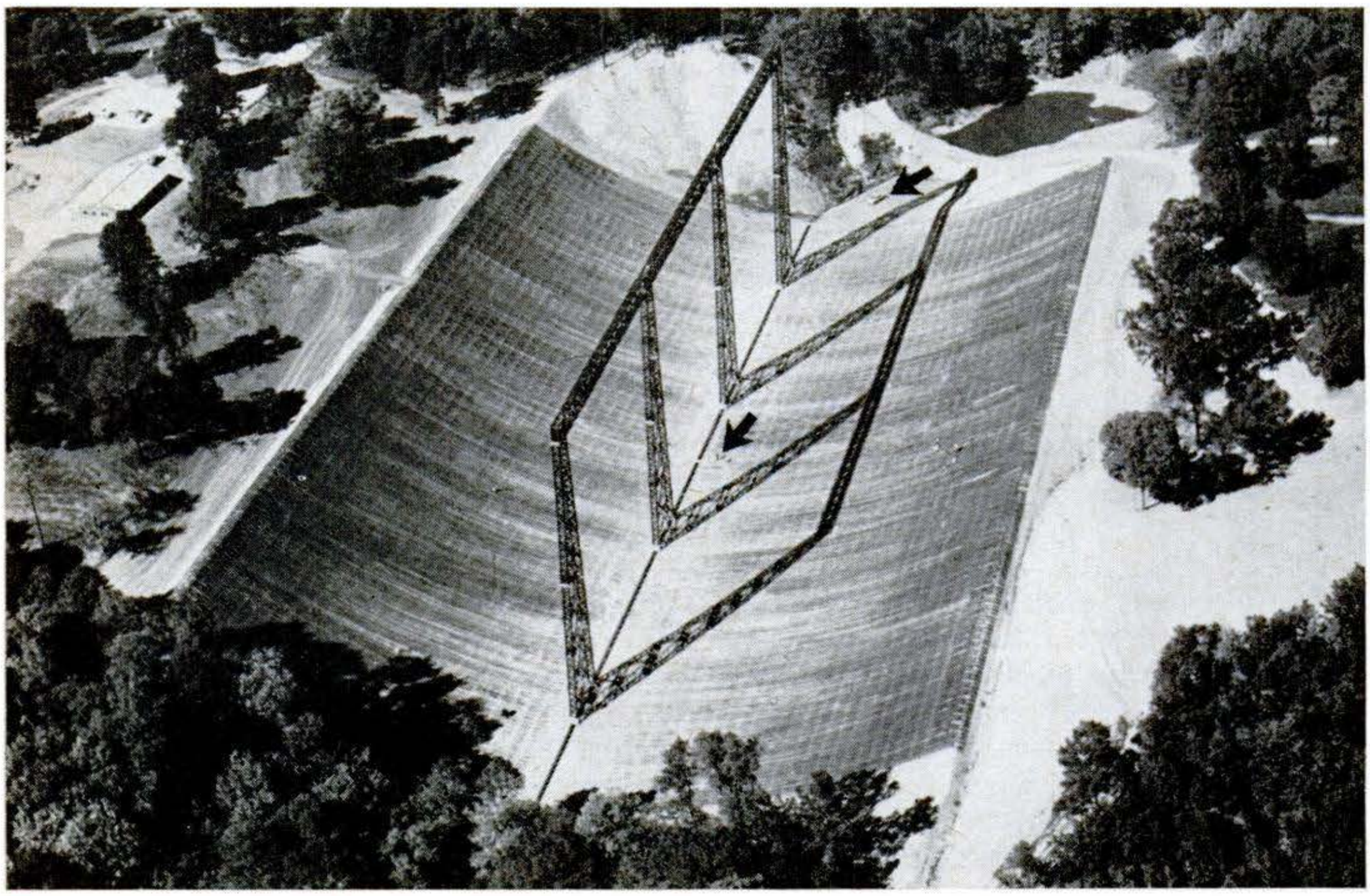
Copyrighted material

Colorado's "Mobilab" for science teachers . . .

. . . gives three-day brush-up course.

## Science laboratory on wheels

Rural teachers in Colorado's elementary schools now brush up on their science subjects in a classroom that comes to them. It's a 32-foot trailer that contains complete basic laboratory equipment to accommodate 14 persons at a time. It stops three days in remote mountain and plains villages, enabling teachers to attend three three-hour refresher sessions under guidance of a specialist.

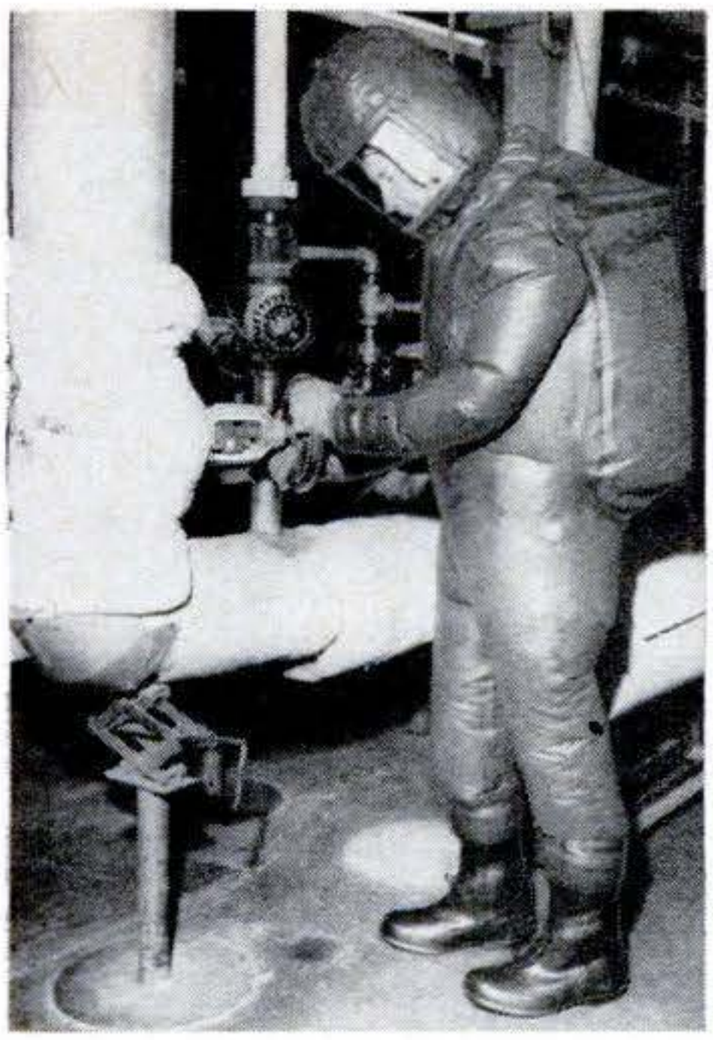


## For signals from outer space

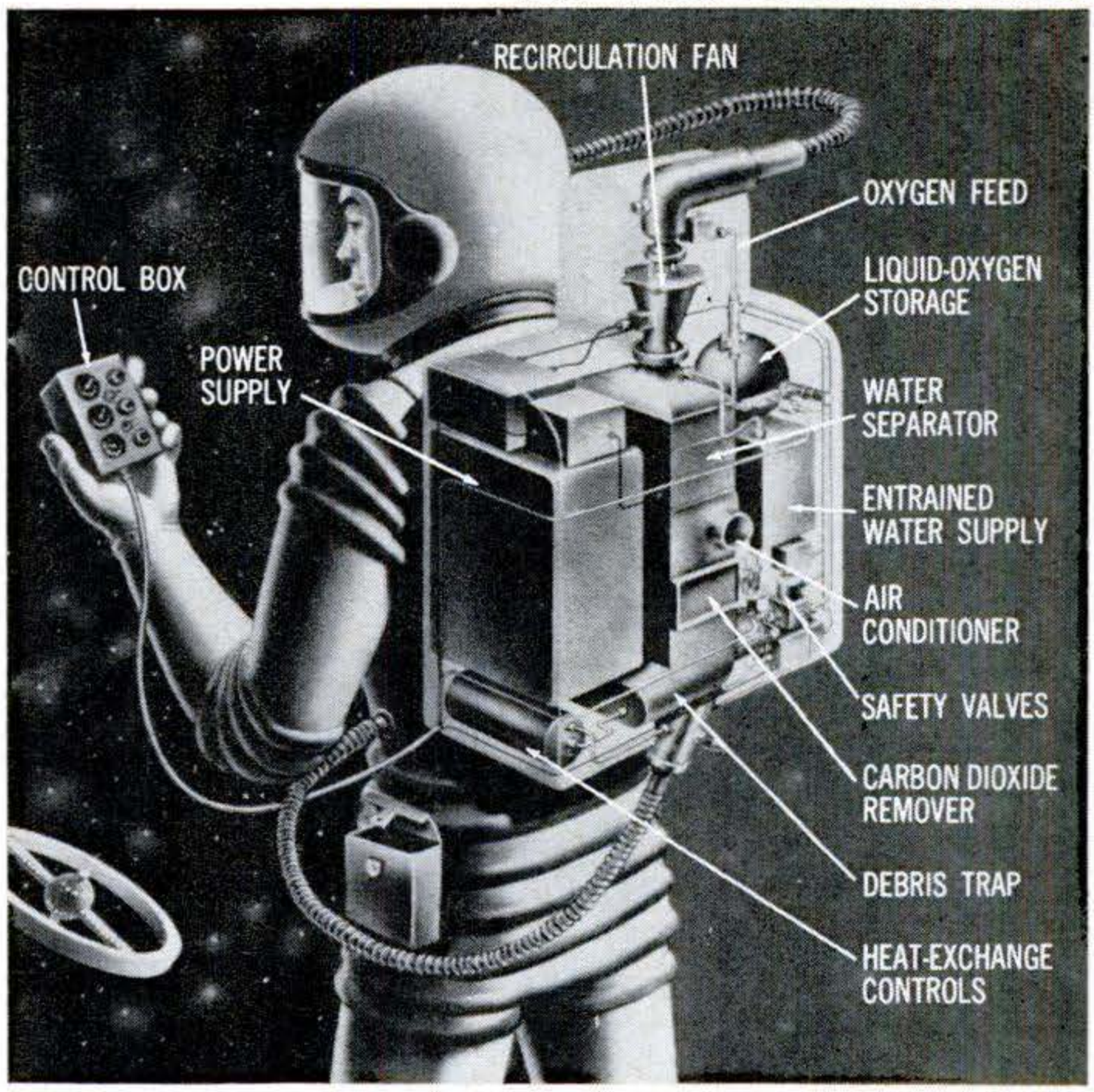
A new giant "radio mirror" is under construction by the University of Illinois in a ravine shaped to fit it five miles southeast of Danville. Its concave expanse is 600 feet long and 400 wide. A man and an automobile in the picture above (arrows) give an idea of its immense size. Receiving units are supported on towers 165 feet high. Financed by the Office of Naval Research, the radio telescope with its huge parabolic reflector is designed to catch signals from space.



Copyrighted material



**SEALED SUIT** keeps out toxic fumes; pack on back supplies oxygen and air-conditioning.




**CUTAWAY OF PACK** shows oxygen tank and system for purifying air for six hours' breathing.

## He carries his climate on his back

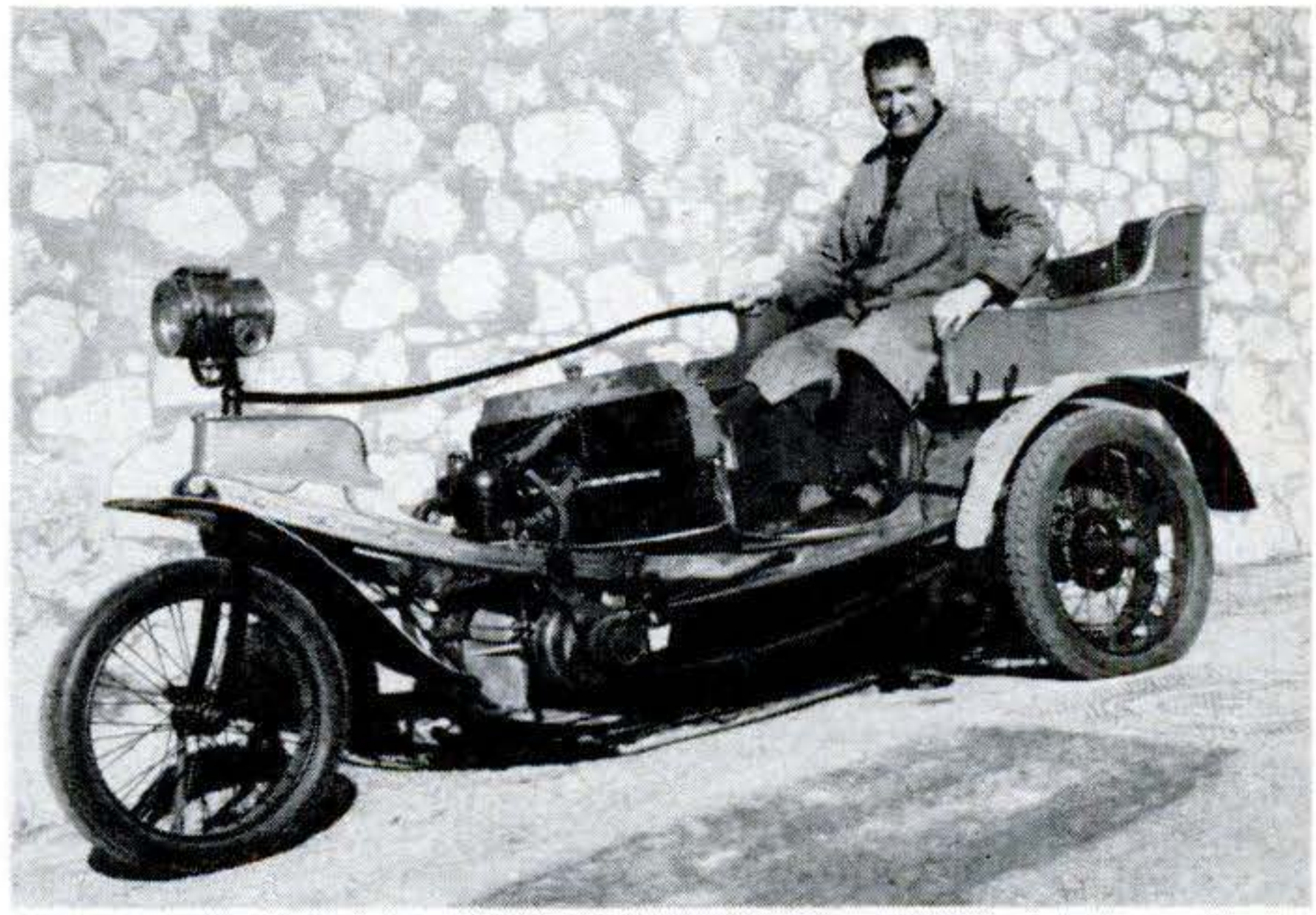
This suit contains its own supply of oxygen, and cools and heats itself for the comfort of its wearer. It was designed for handling toxic missile fuels, fighting forest and mine fires, rescue work, and for jobs where poisonous fumes are encountered. It could also be worn by crews of high-flying planes and space explorers.

The suit holds a back-pack air-recirculation system developed by Garrett Corp.'s AiResearch division. It stores a six-hour supply of oxygen and air-conditioning equipment to warm or cool the wearer in extreme temperatures.

### For the man who's all thumbs

This is a Swedish version of the pushbutton telephone. You press the buttons to get your number instead of twirling the dial.

The phone isn't yet on the general market: only for interoffice use at L. M. Ericsson, Ltd., its maker.



### There's life in the old car yet

This 1898 Lacroix de Laville, one of the earliest French cars, was found recently on a farm in France. Long out of use, it was completely overhauled and made to run like new again by André Scoupe, shown at the wheel, who intends to enter it in antique-car races.



Copyrighted material

# Legal Burglars Crack Safes for a Living

THE OLD WAY

***To keep a step ahead of crooks, manufacturers put their money chests through torture tests***

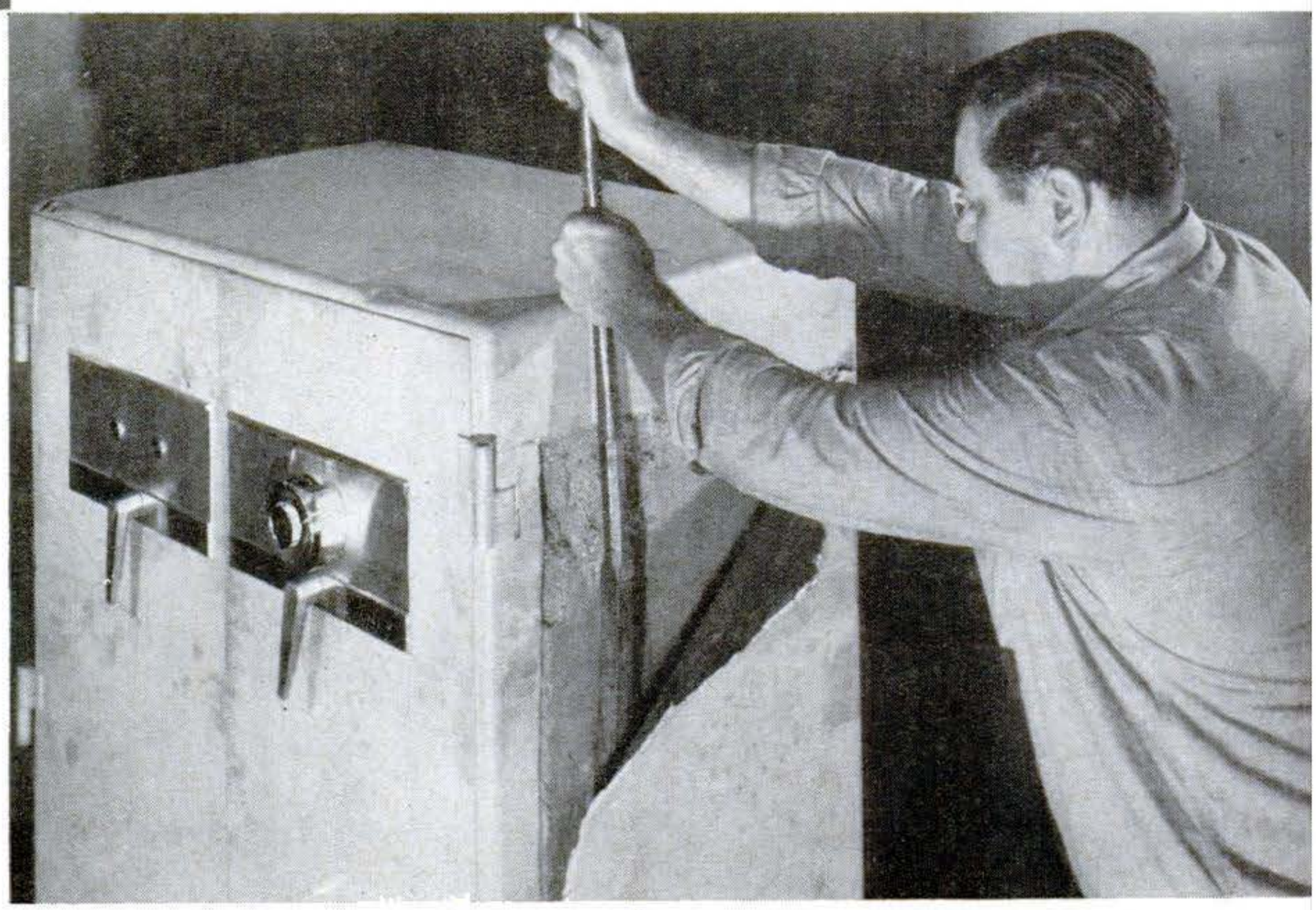
**by Robert A. Kelly**

EVERY day several dozen men throughout the U. S. batter and chisel away at safes. The safes range from small wall units to huge bank vaults. These safecrackers work under the approving eye of the safe manufacturers.

That's because it's legal. The men are paid to try to break into the safes. If they can crack a safe, so can a burglar—and back the thing goes to the design board.

**ATTACKING THE DIAL** on a modern safe (top) throws automatic door lugs into a locked position. Nitroglycerine (center) is risky; tumbler listening doesn't work.

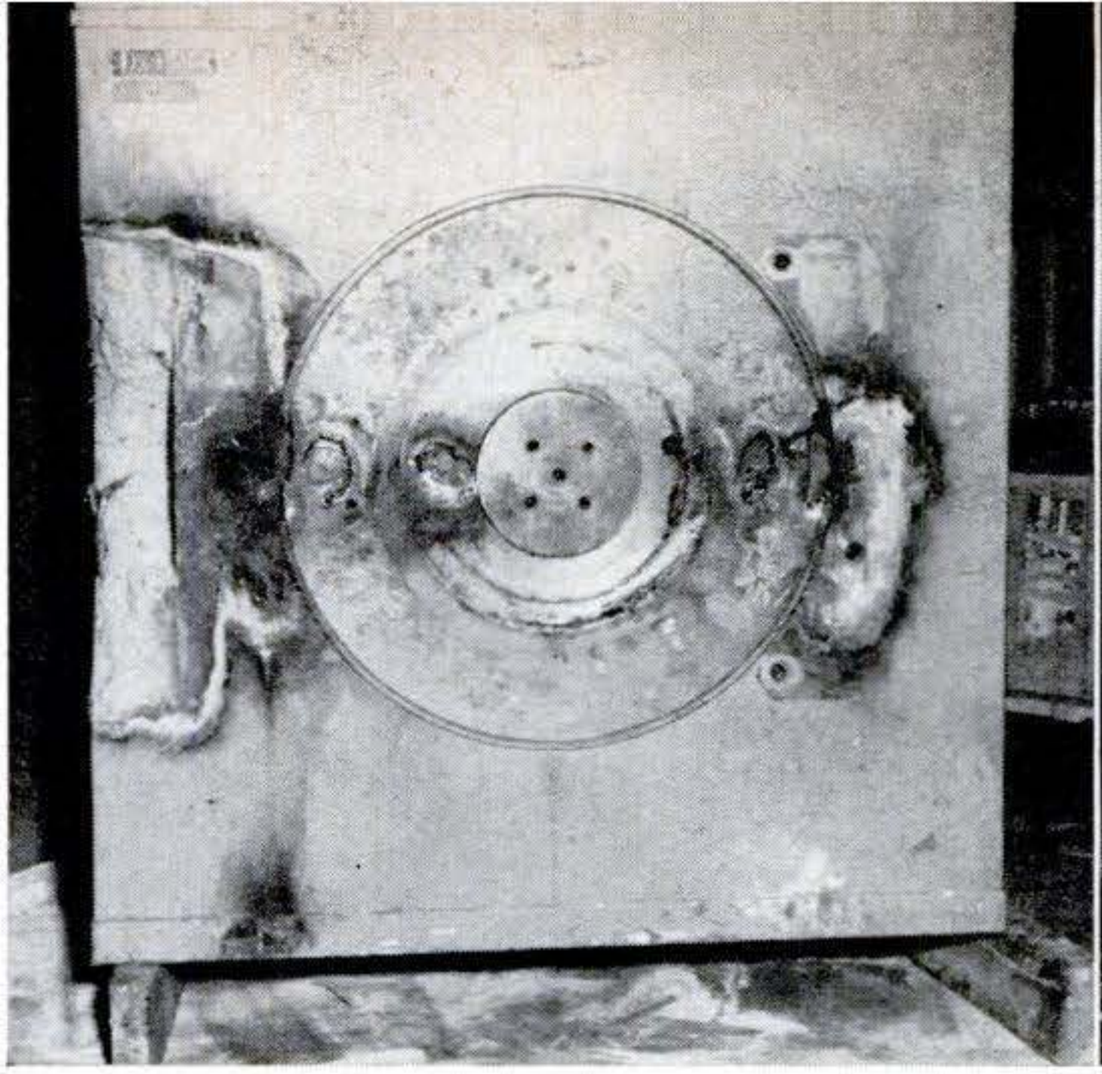
THE NEW WAY



**PEELING** is a common technique of thieves. Outer metal covering is removed before direct assault on a safe's side wall. Here a new model gets the treatment from a professional safe torturer using a crowbar.



Copyrighted material



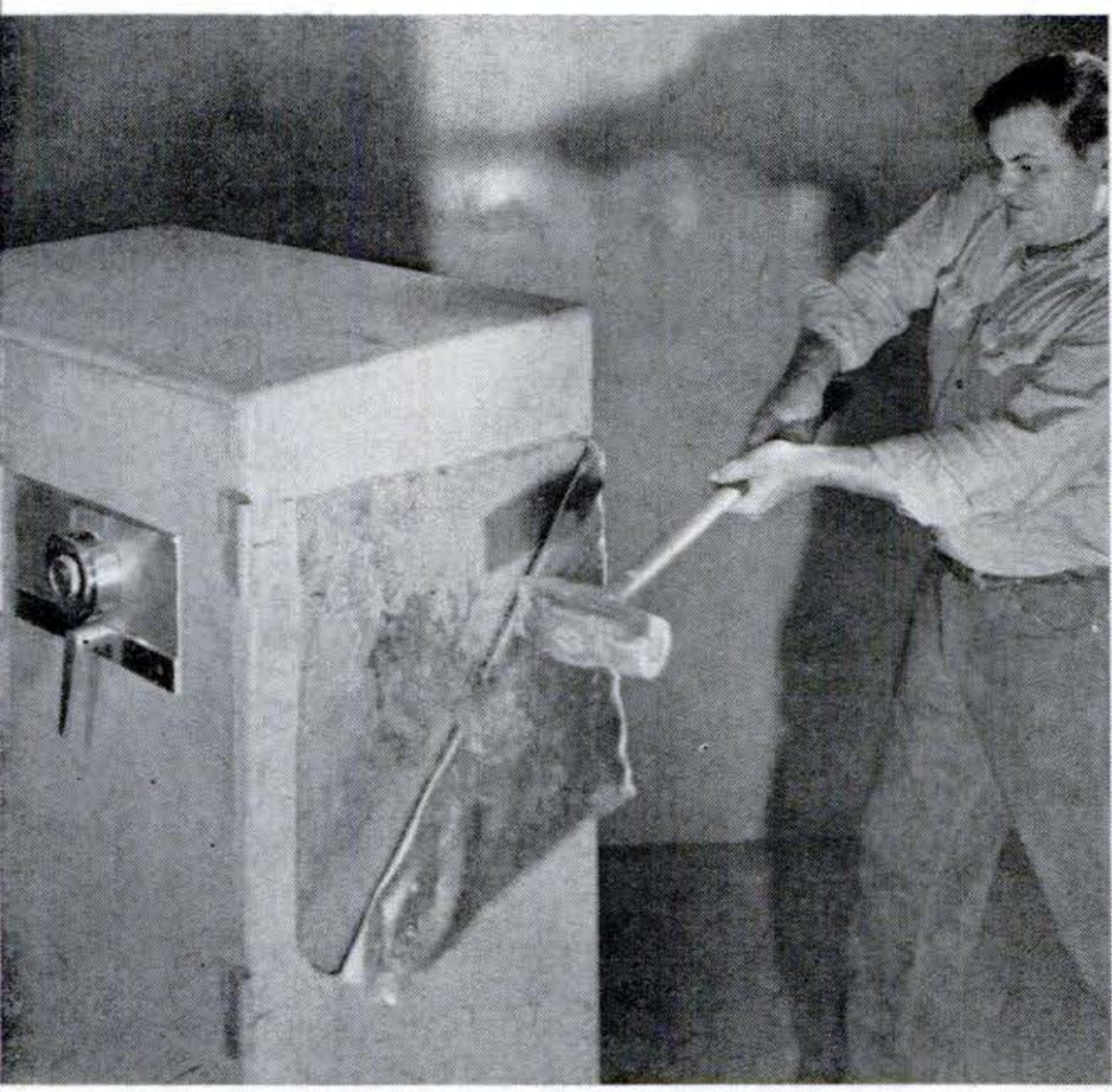
**SAFES THAT COULDN'T BE CRACKED:** Burning through in four different places was tried on the safe above by burglars. A heat-dispersing copper insert plate foiled the attempt. Photo at right shows a safe with cash intact after a peeling and battering onslaught.

Countless robberies, and attempted ones, have provided the manufacturers with a thick book of knowledge on the techniques of professional burglars.

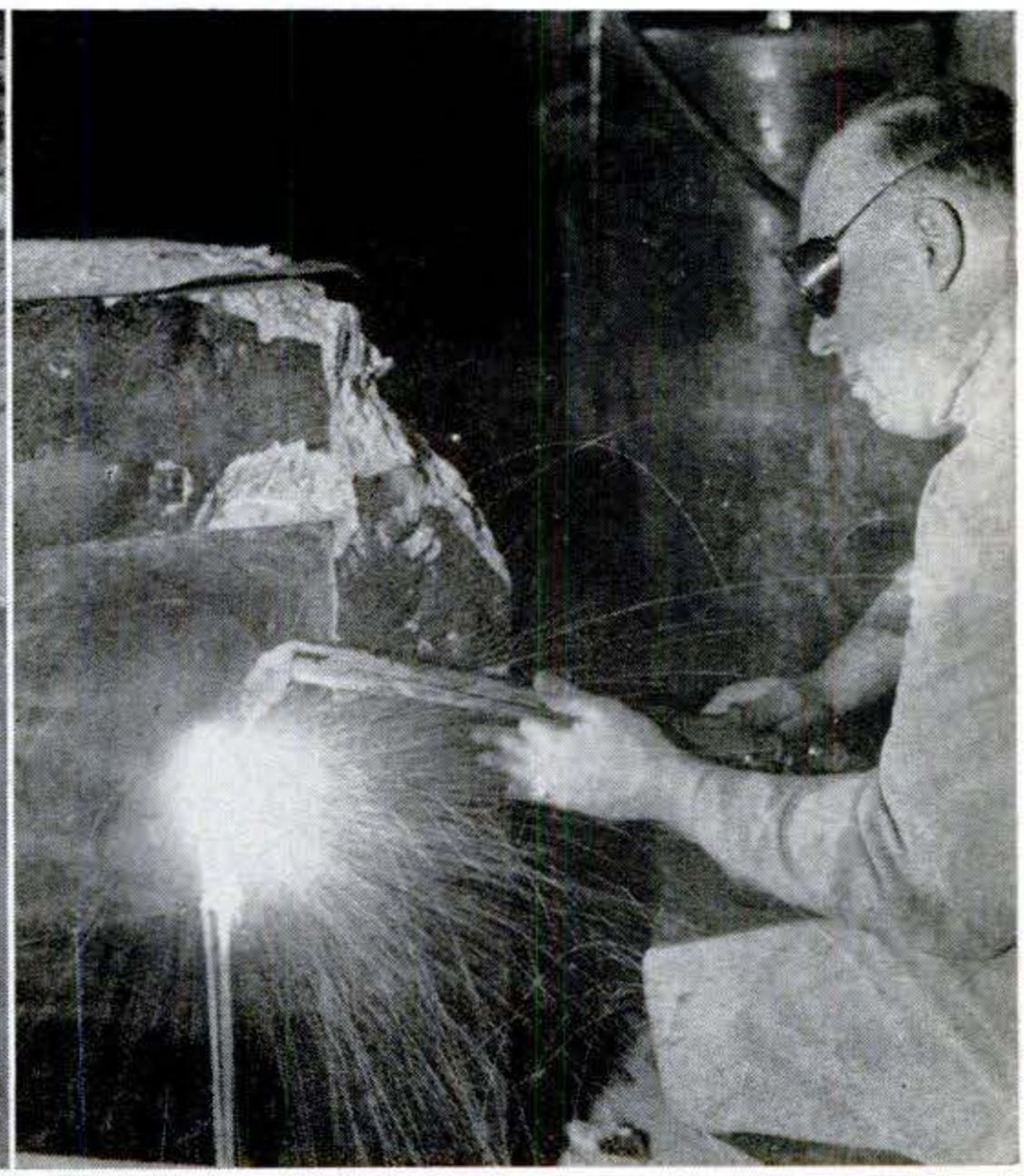
***Tricks of the trade.*** One type of "cracker" will attack the combination dial, using a variety of tools. Occasionally he will put a flaming acetylene torch to it.

Crackers like that are the amateurs. The locking mechanisms of today's safes —thanks to the testing by legal burglars —are built to freeze if anyone tries to force the dial. Explosives—on big safes, anyway—are old hat, too. The safemakers long ago inoculated their products against nitroglycerine.

A bungling burglar breaking into a Kent, Ohio, market packed hams and other cuts of meat around the safe to muffle the explosion. When he set off the charge, it blew the roof off the building,



**BATTERING** is the next step after peeling. If this sledge-hammer pounding fails to gain entry the safe is considered burglarproof.

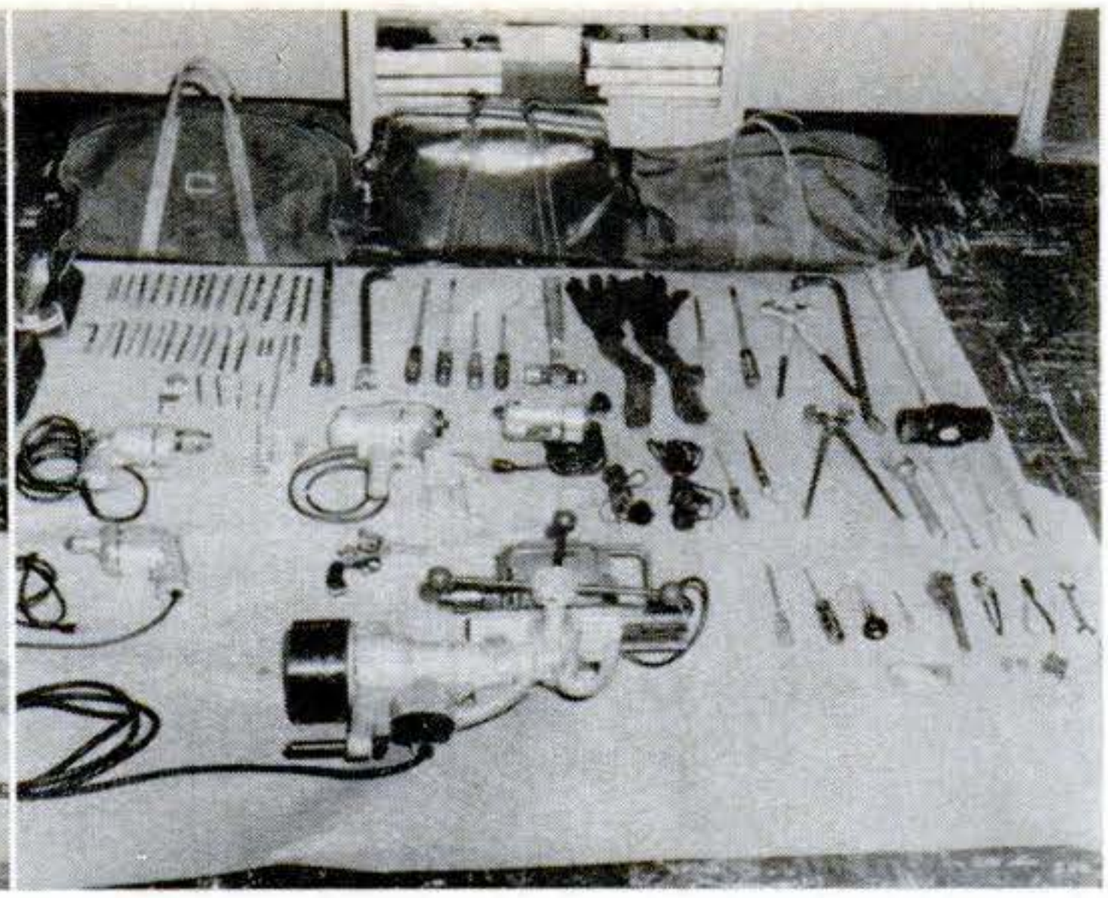


**ACETYLENE TORCH,** a standby with most professional safecrackers, is often resorted to after peeling and battering have softened a safe.

CONTINUED



Copyrighted material



**TWO-PART SAFECRACKING KIT** of an expert in the business even includes a walkie-talkie radio for communicating with a lookout, and up-to-date literature from safe manufacturers. The kit got its owner more than $400,000 in loot before he was killed by police in a gun battle.

scattering choice meats far and wide. Neighborhood dogs for blocks around had a picnic. There are cases on record of safeblowers who have been killed by their own blasts.

And working a combination with sandpaper-sensitized fingers went out with Jimmy Valentine. A lock's tumblers don't tumble for that any more.

**A WOULD-BE SAFEBLOWER** in Canton, Ohio, abandoned this job, probably because he was afraid to set off an overcharge of nitroglycerine. It was opened by an Army ordnance officer after nitro had been neutralized with alcohol.

The legal burglars, teamed with the designers of safes, are in a constant battle of wits with the underworld. When, a few years ago, criminals began using improved, hotter torches, the designers sandwiched copper inserts between the safe's thick outer layers of steel. The inserts dissipated the heat from a torch so rapidly that burning through became impossible.

When the criminals began using improved drills, the designers tried case-hardened metal inserts. This seemed like the answer—until the criminals hit on diamond and carbide drills. Once again safe manufacturers were on the defensive.

***Where do they stand today?*** It's something of a secret. Understandably, neither safemakers nor the underworld will talk about their latest developments.

Within-the-law crackers still attack some types of safes—the smaller ones—with explosives. That's because criminals do manage to open some that way. Test tools also include sledge hammers and crowbars, used to peel the tough layers from the sides of a safe. If burglars can get them off, the designer has failed. For the concrete inner liner may then yield to a drill.

Of the two dozen safemakers in this country, many use the testing facilities of the Underwriters Laboratories in Chicago in addition to their own test men.

They are making progress. Recently, in Detroit, burglars who fruitlessly attacked a safe left this message scrawled on the wall: "You've got a hard safe to crack. We'll try again!"

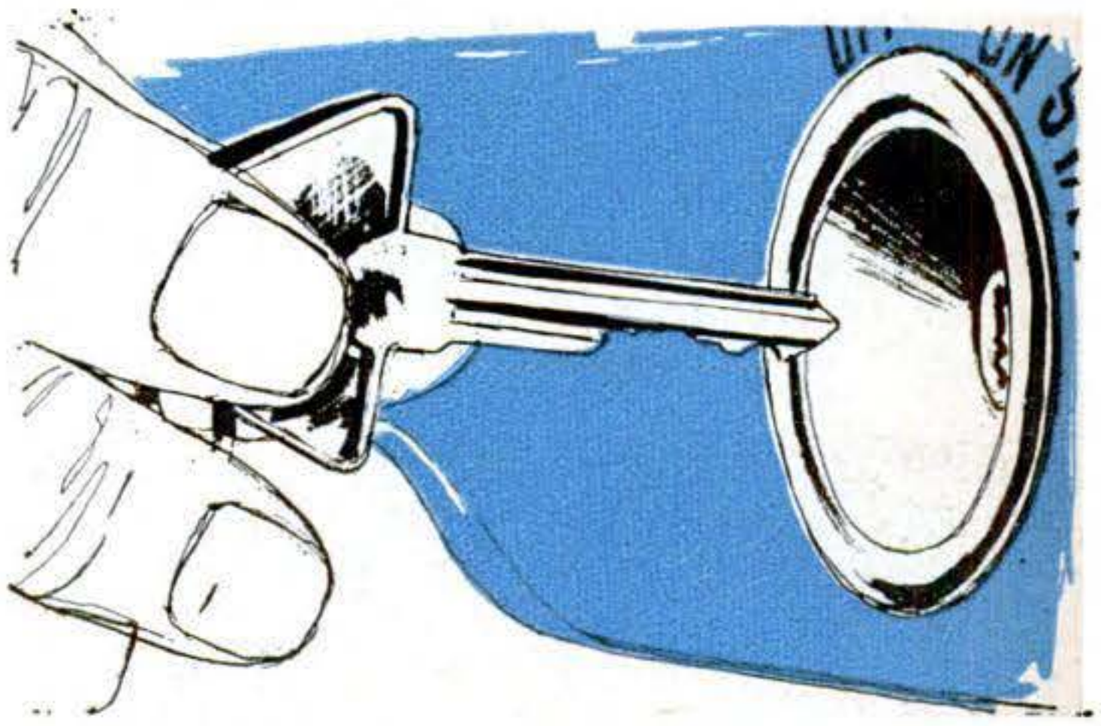


Copyrighted material

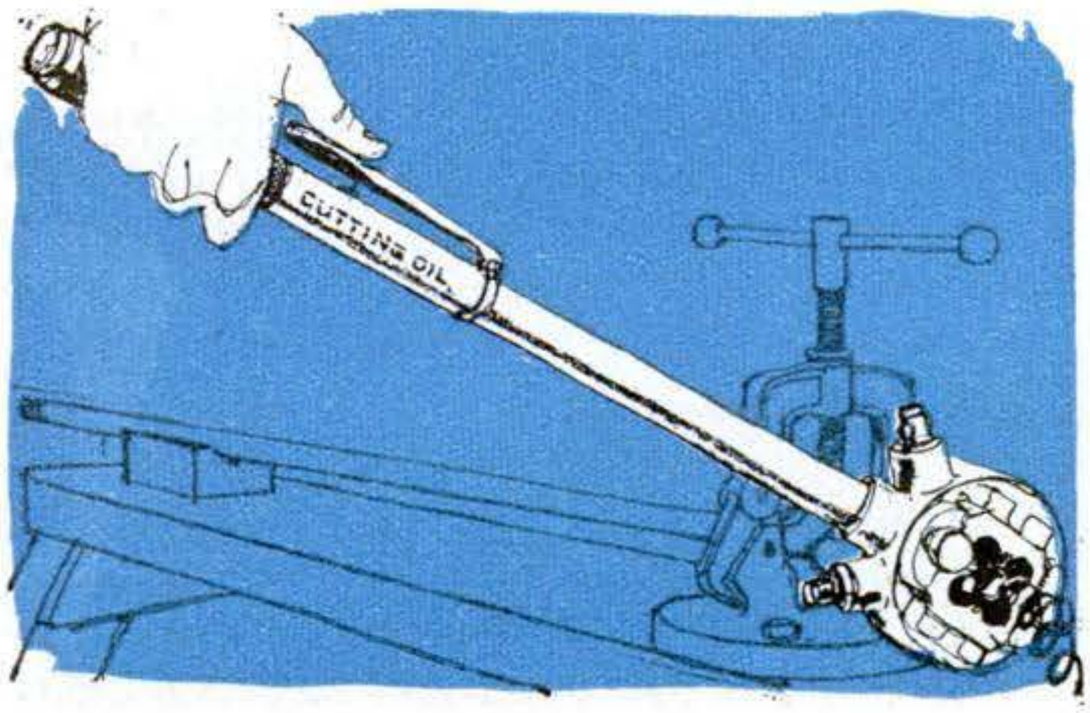
# "I'd like to see them make..."

**PUSHBUTTON FLOOR TRAPS** at bank tellers' windows. A robber dropped into a cell beneath the floor would be held securely until police arrived.—*Dan Stallings, Van, Texas.*

**PICK-THE-SPOT LP RECORDS** so you could guide the needle to a particular piece of music. Why not white interval spaces between the recorded bands?—*Cy Groves, Calgary, Canada.*



**A FUNNEL-SHAPED LEAD-IN** for a car's ignition key. An integral part of the ignition switch, it would guide the key directly into the keyhole. —*R. D. Remy, Rochester, Ind.*




**TRIGGERED PUMP OILERS** in the handles of die stocks and tap wrenches, and an oil exit at the cutting point. No more stops to apply oil.—*A. R. Tanner Jr., Poughkeepsie, N.Y.*

**CHILDPROOF SINK CABINETS** you'd open with a pushbutton or lever on the top. This would keep toddlers from reaching harmful cleaning chemicals.—*Mrs. M. Koslover, Reading, Mass.*

Everyone has his own pet idea of a gadget that he would like to see in general use. The five ideas illustrated above were suggested by POPULAR SCIENCE readers. What's *yours?* We will pay $5 for each one published. Please use Government postcards only. Write name and address clearly. Contributions cannot be acknowledged or returned.



Copyrighted material

**COMBINE** cuts and stacks a cord of wood in 20 minutes. It's happiest in a dense stand of timber.

*Here's how it works* ▸

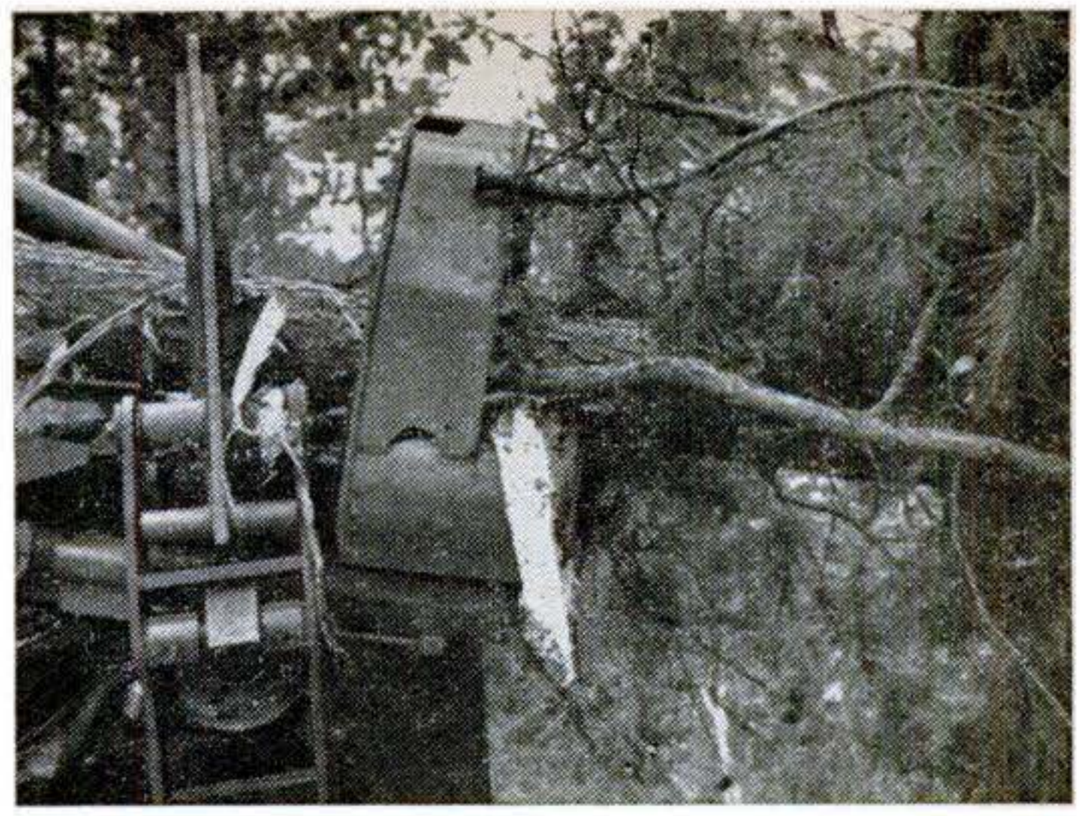
1 **TRUNKS ARE CUT** almost at ground level to minimize waste. These hydraulic-piston-operated scissors can shear a trunk up to 19 inches in diameter in about seven seconds.

# Tree-Chopper Cuts,



Copyrighted material

**2 FLEXIBLE, SHARP-EDGED DE-LIMBER** gets set to lock around a tree trunk. The hydraulically operated foot-wide cutting belt can shear off limbs almost six inches in diameter.



**3 SPRING-LOADING** enables de-limber to get close to the trunk, compensating for the taper of the tree. A scissorlike bucking blade follows through, lopping off pulpwood lengths.

# Stacks Pulpwood... *and it works*

## *four times faster than an expert chain-saw crew, with far less waste*

THE combine lumbered through the forest like a monster beetle in search of a meal. It spotted its prey—a pulpwood-size tree—and wriggled toward it, its jointed, two-piece chassis flexing.

It stopped. Clawlike scissors grappled for the tree. *Snap!* They bit into the trunk. The tree shuddered. Slowly at first, then faster, the tree toppled forward, the direction of its fall controlled by the wedge action of the blade.

A steel arm lifted the victim onto a carriage that pushed the tree rearward. A sharp, foot-wide flexible steel belt wrapped around the trunk and slashed off the limbs. At the same time a bucking blade snipped 63-inch logs from the trunk and spat them out. A cradle caught the logs, bound them in cord-size bundles, and deposited them vertically.

This demonstration took place recently in Louisiana. The super-machine, a prototype developed by International Paper Company, passed all its tests in high style, indicating that the pulpwood-

**4 TRUNK RIDES A CARRIAGE** that pushes it 63 inches at a time. The hydraulic bucking blade cuts it into even lengths, which drop into a cradle. There they are bound and dropped.

CONTINUED



Copyrighted material

**5** **PICK-UP-STICKS RIG,** working on principle of the human arm, picks up and loads the 7,000-pound bundles. Lifting each load requires up to 1,500 p.s.i. hydraulic pressure.

logging industry is due for some changes.

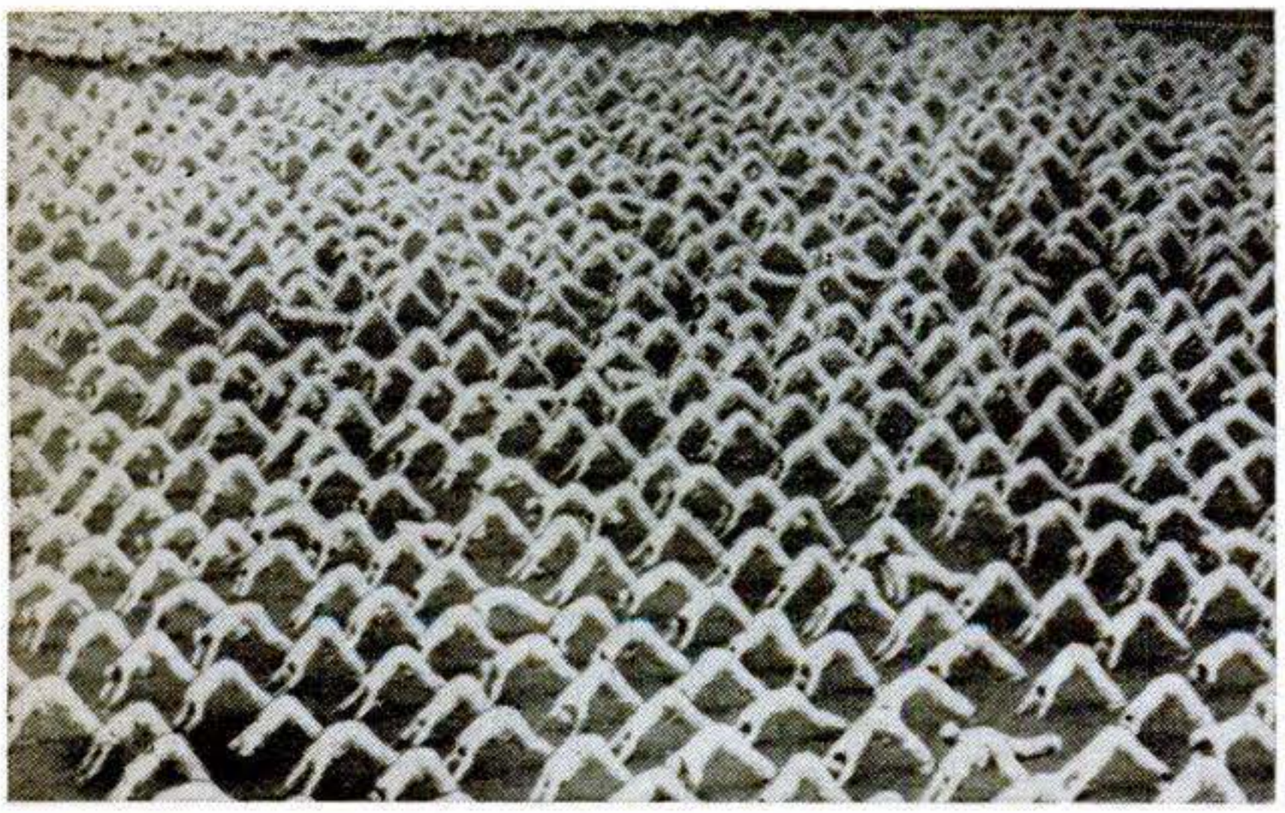
***What is it?*** Basically the combine is a heavy-duty four-wheel-drive tractor powered by a GMC 371 diesel engine and Allison torque converter. Engineering the chassis wasn't a major problem: The vehicle had to conform to certain dimensions to comply with highway regulations; it had to be self-propelled; it had to be jointed in the middle to give it an extra-short turning radius and to keep all four wheels down on rough terrain.

Designing the cutting and stacking rig, however, was a seven-year labor for perfection. The idea was to get the most work out of the tractor with the least effort. Earlier versions of the blade felled trees at right angles to the tractor. No good. The machine would have to move around for the next stage. So the blade was positioned to fell trees parallel to the tractor.

***More snags.*** Then came the de-limbing problem. "That was when we really got off the ground," said designer T. N. Busch. Hoisting the whole tree on board the tractor turned out to be the tidiest solution. The de-limbing belt and traveling arm neatly stripped the tree of its limbs. The bucking blade followed through.

Stacking and tying the cut wood vertically was a final bit of ingenuity that eliminated a serious work menace: More than one lumberman slinging wire on the ground finds a snake in the woodpile.

The two-man, almost-automatic combine now cuts and stacks two cords of wood an hour—four times what a pair of woodcutters can do.—*Alex Markovich.*



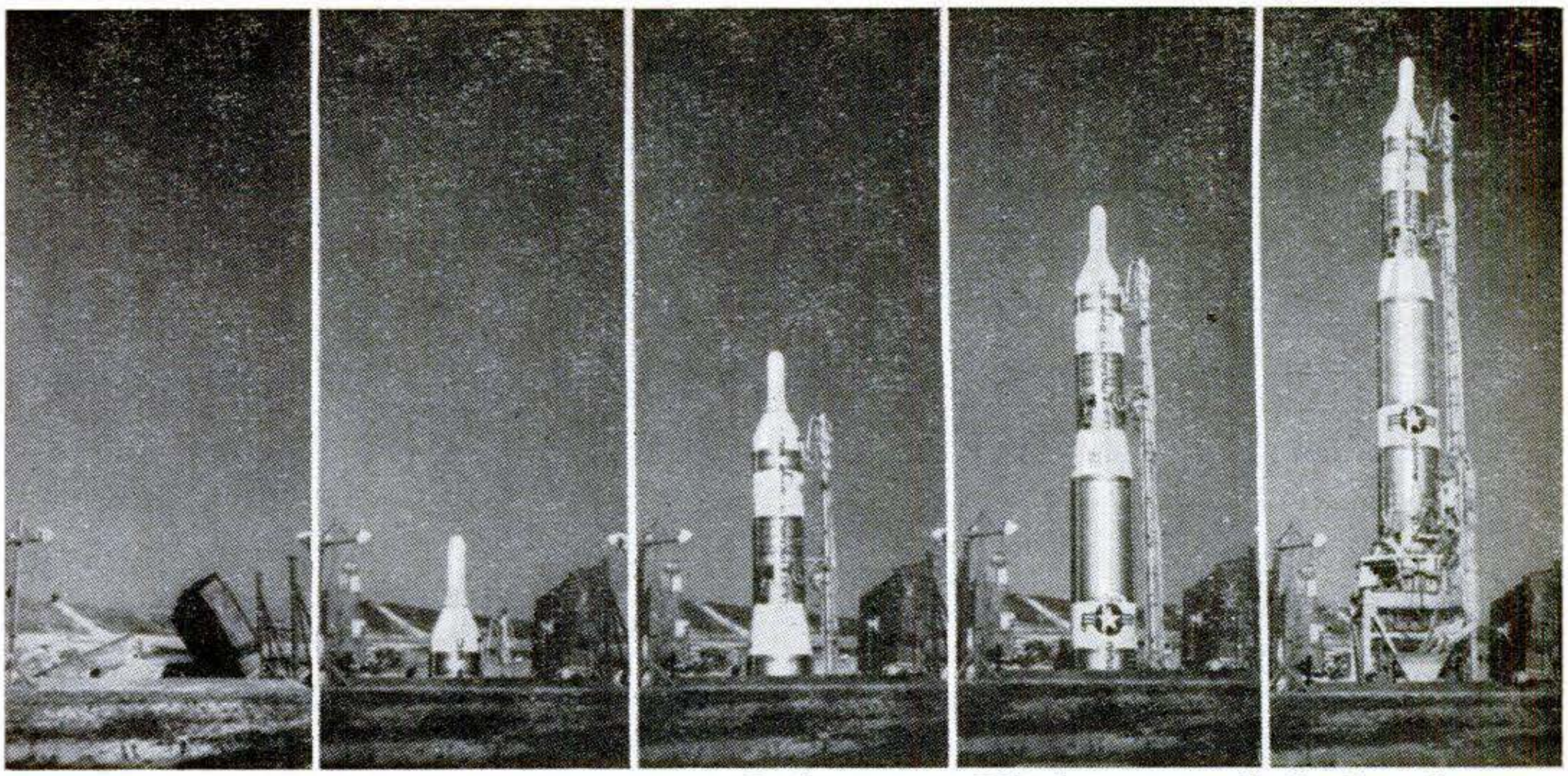
# What is this?

**Can you identify the pattern of objects in this picture? Check your answer below**

ANSWER: The objects are people—a mass of students doing exercises at the Japanese Gymnastic College in Tokyo. The athletes—20,000 strong—came from all over Japan to attend the meeting.



Copyrighted material



Trap door opens . . . nose pokes out . . . rises higher . . . and higher . . . ready for launch.

## Big bird leaves its underground nest

This sequence of photos, taken at Vandenberg Air Force Base in California, shows the raising of a Titan I missile from its underground steel-and-concrete silo in a practice launching drill. It's automatic. As the 200-ton doors open, the 97-foot, 110-ton intercontinental ballistic missile is raised on an elevator to the surface where it can be fired. Operation is completed in minutes.

## Wireless tape recorder

This supermarket clerk is taking inventory by speaking into a radio microphone. The rest of his remote-control recording system is in the store's office.

The unit has a half-mile range and operates on citizens-band channels, making it handy for inspection-reporting, training, and police work. American Geloso Electronics, New York, developed the system, sells it with transmitter and recorder for $1,000.

## Submarine-launched landing craft

The Marines have a new landing craft. Their smallest and lightest, it can be launched from a submarine. The rubber boat is placed on the deck of a surfaced sub, inflated, and manned by seven Marines. Then the sub dives, and the Marines paddle off on their shore mission. The process is reversed for getting them back on the sub again.



Copyrighted material

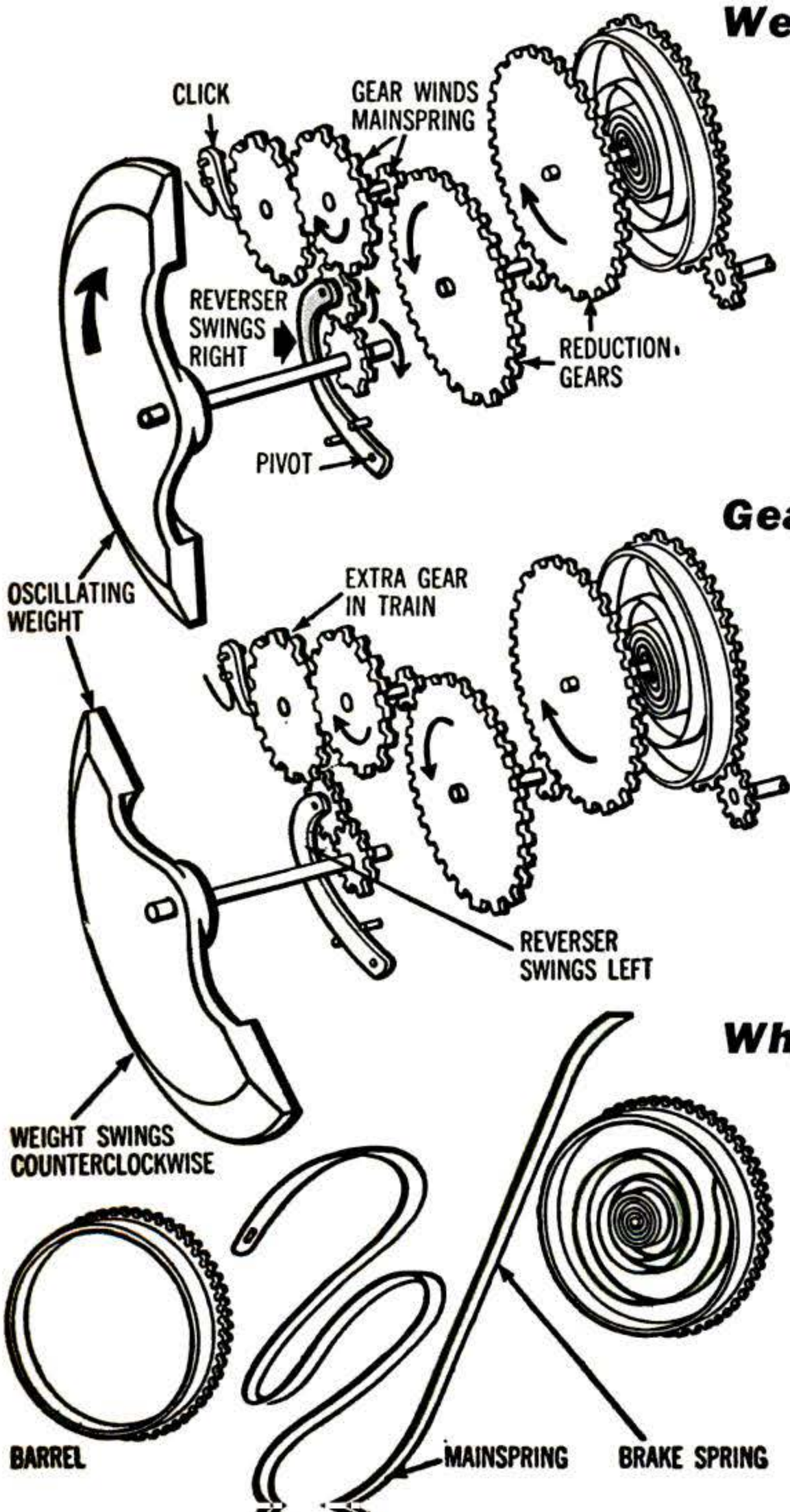
# How a Self-Winding Watch Works

TODAY'S sleek self-winding watch dates back to 1752, when an instrument textbook described a pedometer that wound a watch as one walked.

In the common pedometer used to measure walking distances, a pivoted weight is so balanced by a hairspring that each step of the walker swings it down momentarily. A spring finger advances a fine-toothed count wheel as the weight swings back; a click or detent holds the wheel during the downswing.

A Swiss watchmaker applied this action to a watch around 1800, and during the next 20-odd years many self-winders were made. In 1893, the Swiss mass-produced one with a reserve-power indicator. With the wrist watch, in which arm movement wound the spring, self-winders became practical for everyone.

In earlier actions, the weight hit springs at each end of its swing and wound only when turning in one direction. In modern types, the weight can turn completely around, and winds going either way—so restoring mainspring energy more quickly and reliably. The action at right and below is the Bidynator, made by Felsa in Switzerland and used in some Bulova, Benrus, and Gruen watches.




## Weight winds spring through gear train

**FREE TO TURN AROUND** completely, the oscillating weight swings one way or the other as the wearer moves his arm. A pinion on the weight shaft meshes with a gear turning on a curved arm. Pivoted at its other end, the arm is held toward the right, and its gear engaged with the right-hand one of the pair above it, by clockwise rotation of the weight shaft. This rotation, through the gear train, turns the mainspring shaft clockwise, so winding the watch.

## Gears shift as weight swings back

**WHEN THE WEIGHT STOPS,** a click on the left-hand wheel holds the winding train. As the weight swings the other way, the click prevents rotation, so the pinion rolls the reverser off the right-hand gear into mesh with the left-hand one. Now it turns this left-hand gear in the direction permitted by the click. Driving through an extra gear, counterclockwise rotation of the weight turns the mainspring shaft clockwise, the same way as before, and so again winds the watch despite its reversed swing.

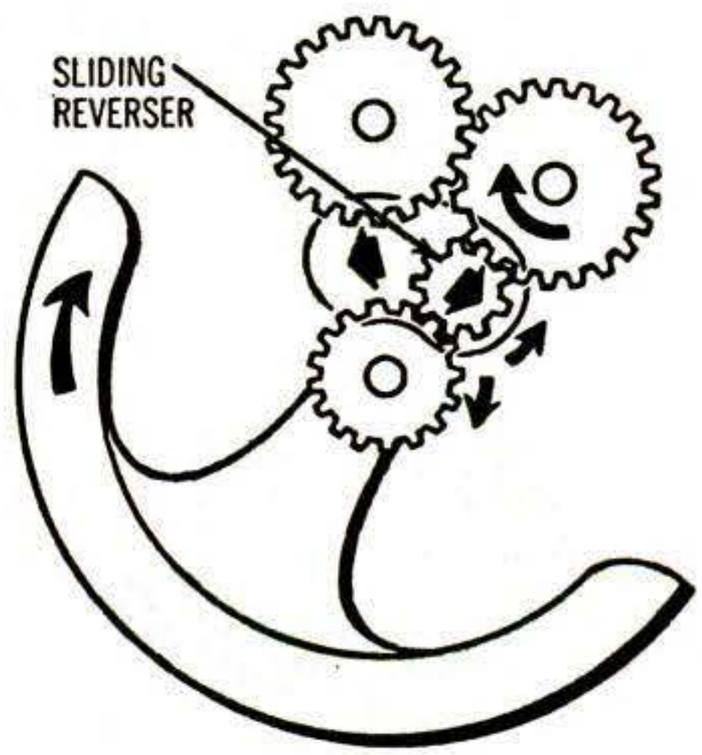
## Why overwinding can't break springs

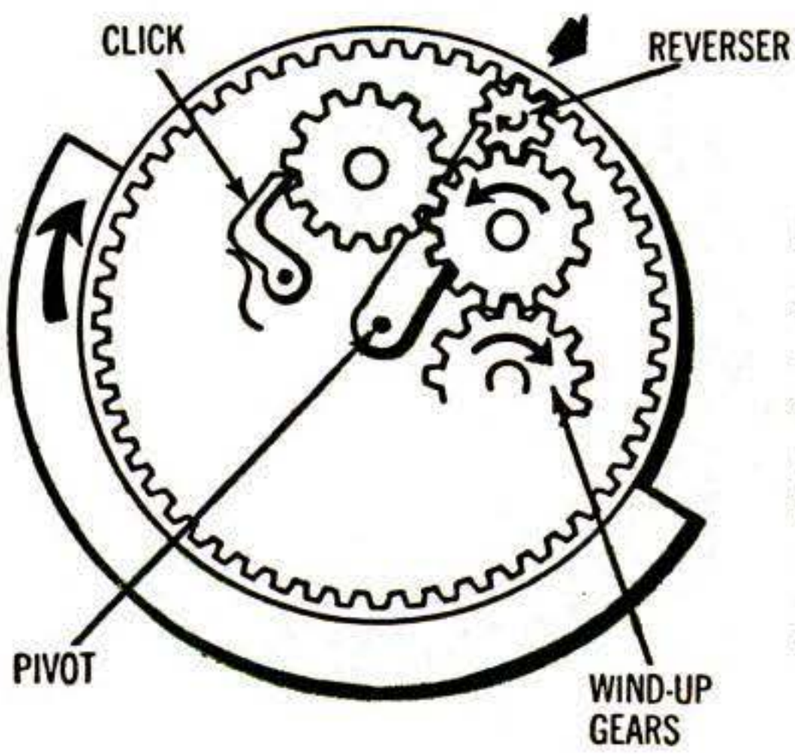
**COILED UP** in a shallow barrel and wound by the shaft on which it is fixed, the mainspring has a short, stiffer, brake spring fastened to its outer end. This presses against the smooth inner wall of the barrel. Acting like a friction clutch, it drives the barrel and the watch movement. But when almost fully wound, the mainspring's constricting coil pulls the brake spring off the barrel wall. It then slips around until the mainspring unwinds enough to let the brake spring again apply driving friction.

Copyrighted material

## *Three other kinds of self-winding action and how they work*

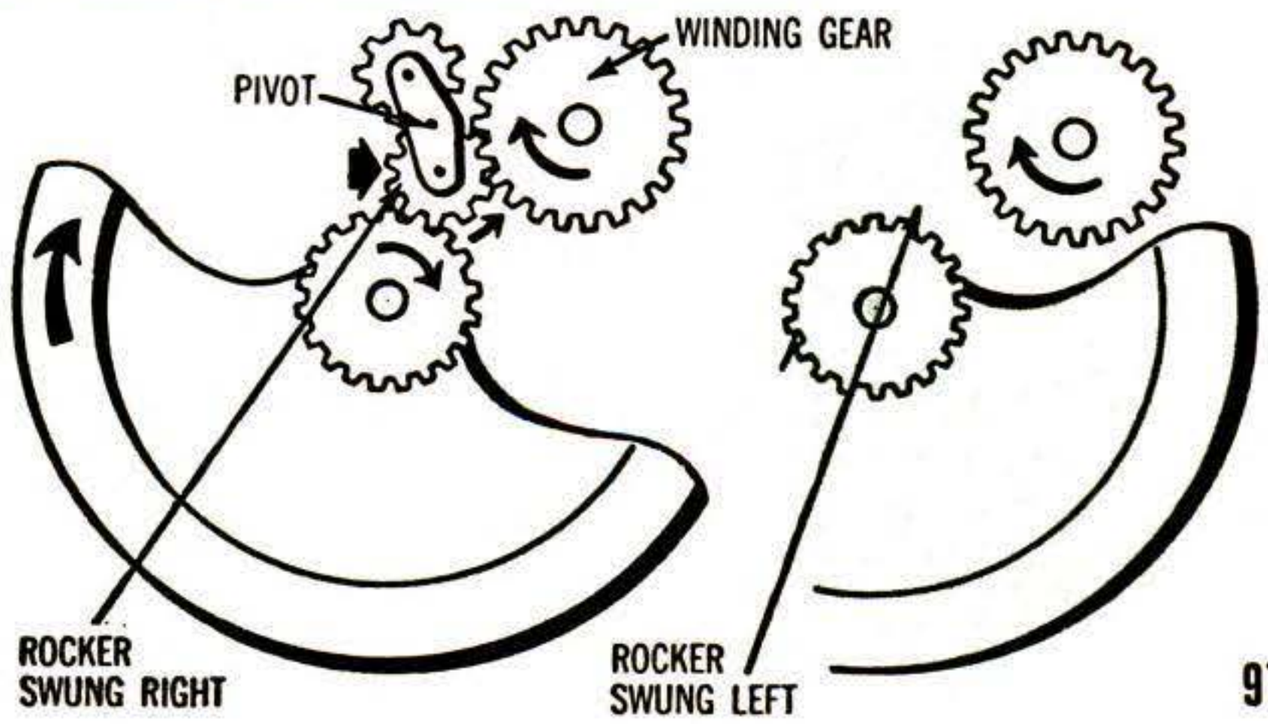
**ULTRA-THIN SELF-WINDERS** have oscillating weights (or rotors) of half the size mounted within the movement. The one at right also has two meshed winding gears with a reverser between them and the rotor gear. But this reverser has no pivot; it lies free in a shallow recess. Under each gear is a disk of its pitch diameter; when two disks touch, their gear teeth are perfectly meshed. As the rotor turns clockwise, it rolls the reverser into mesh with the right-hand winding gear. On counterclockwise rotation, the reverser slides into mesh with the left-hand one, again driving the wind-up train and mainspring shaft in the right direction.




**SHAFTLESS ROTOR** running on a circle of ball bearings energizes the action at left. The rotor's internal ring gear meshes with a reverser gear on a pivoted arm. Turning clockwise, the rotor swings the reverser into mesh with the right-hand winding gear. The reduction gear below revolves clockwise, a two-way click on the left-hand winding gear holding the train as the rotor stops. Turning counterclockwise, the rotor gear swings the reverser off the right-hand gear to the left-hand one, which reverses rotation to drive the reduction gear clockwise, winding the mainspring as before.

**TWO ROCKER GEARS,** in mesh on a center-pivoted arm, alternate to drive the action at right. Clockwise rotor motion swings the lower alternating gear into mesh with winding gear, which turns clockwise. When the rotor turns counterclockwise (far right) the rocker arm tilts to the left, and the upper alternating gear engages the winding gear. As there is now an extra gear in the train, this rotation drives the winding gear clockwise again.






Copyrighted material

# The Tough and Ticklish Job of Air Refueling

***With a trapeze artist's split-second timing, the B-52 hooks onto its tanker in mid-air and gulps 15 tons of fuel***

**By Capt. T. W. Sherman Jr.**

AS OUR B-52 turned high over Scranton, my interphone crackled, "We're coming up on our tanker. Are you ready for the refueling?"

Thus began my first try at air refueling, one of the most demanding jobs in flying today. Any SAC bomber pilot will tell you that he sweats out air refueling more than anything else. It takes all the skill and guts he's got to wrestle a big bomber in behind a tanker where a slip can mean flaming disaster.

Planes have collided, refueling booms have been ripped off tankers, and men have been killed refueling. It gets so hairy that even the tanker crews get shook at times. A veteran tanker pilot told me, "You'd never get me back there to watch a refueling—it scares the hell out of me!"

"Roger, I'm ready," I answered now. I had watched other pilots refuel so I knew how it was done. Of course, doing it myself might be a different story, and an instructor, Capt. Bill Penzien, was on hand to keep me out of trouble.

Our tanker, a KC-135 jet, is orbiting Montpelier, Vt., with 30,000 pounds of fuel for us. Capt. John Busbee, our radar operator, reports over interphone, "Pilot from radar, I've got a beacon at 180 miles."

"Roger, check the code."

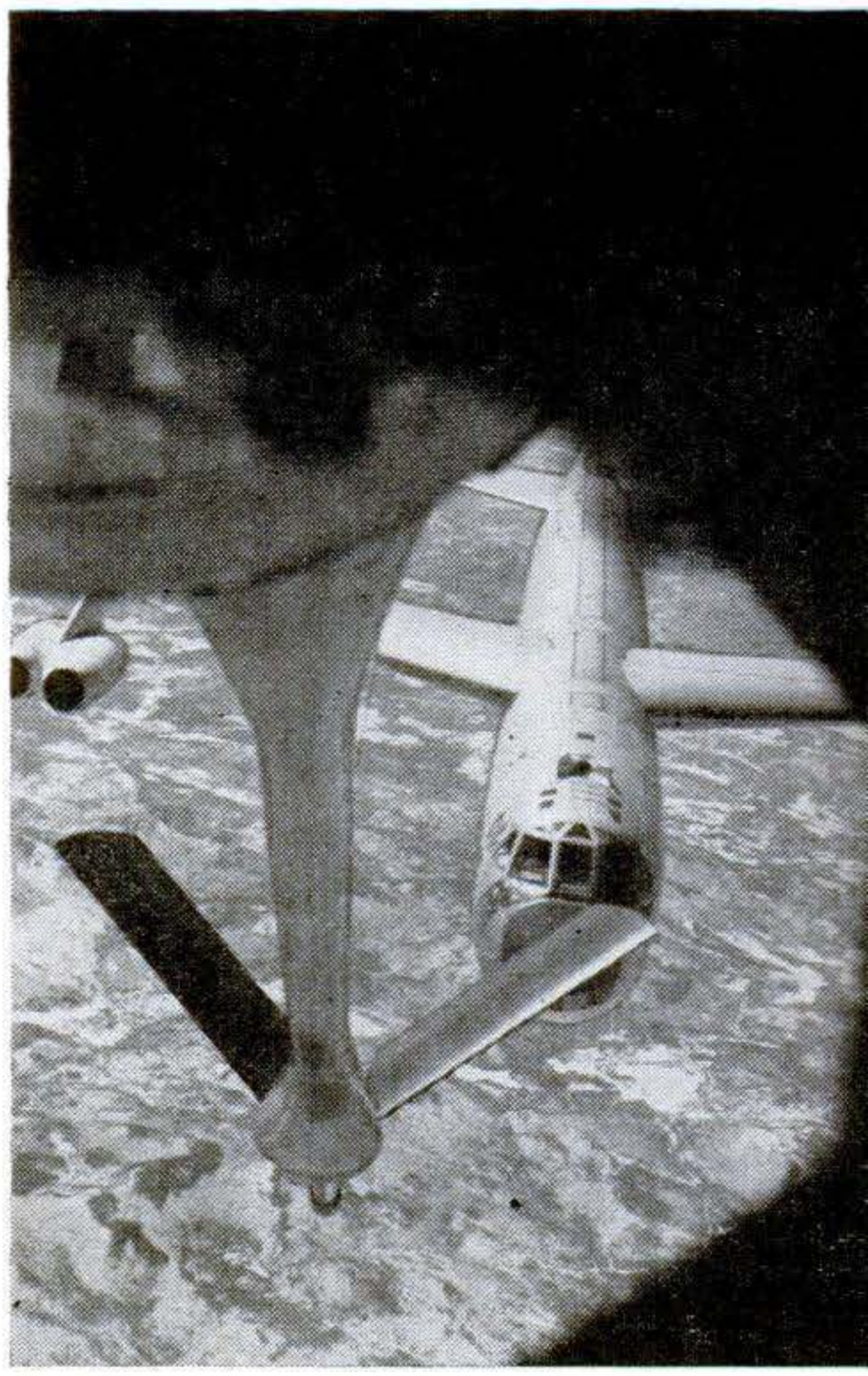
The tanker's beacon transmitter puts a coded series of blips on Busbee's radar scope. He identifies the tanker by its code.

"It's ours; the code checks."

In a few minutes we're 80 miles from the tanker and we descend to his altitude. Busbee and his radar keep us on course and posted on the distance to the tanker.

As I bank the plane to intercept the tanker, I'm aware of the heaviness in the controls that is characteristic of this tremendous Boeing B-52. You

***Here's what the operation looks like from outside***



***And here's a tanker's eye-view***



Copyrighted material

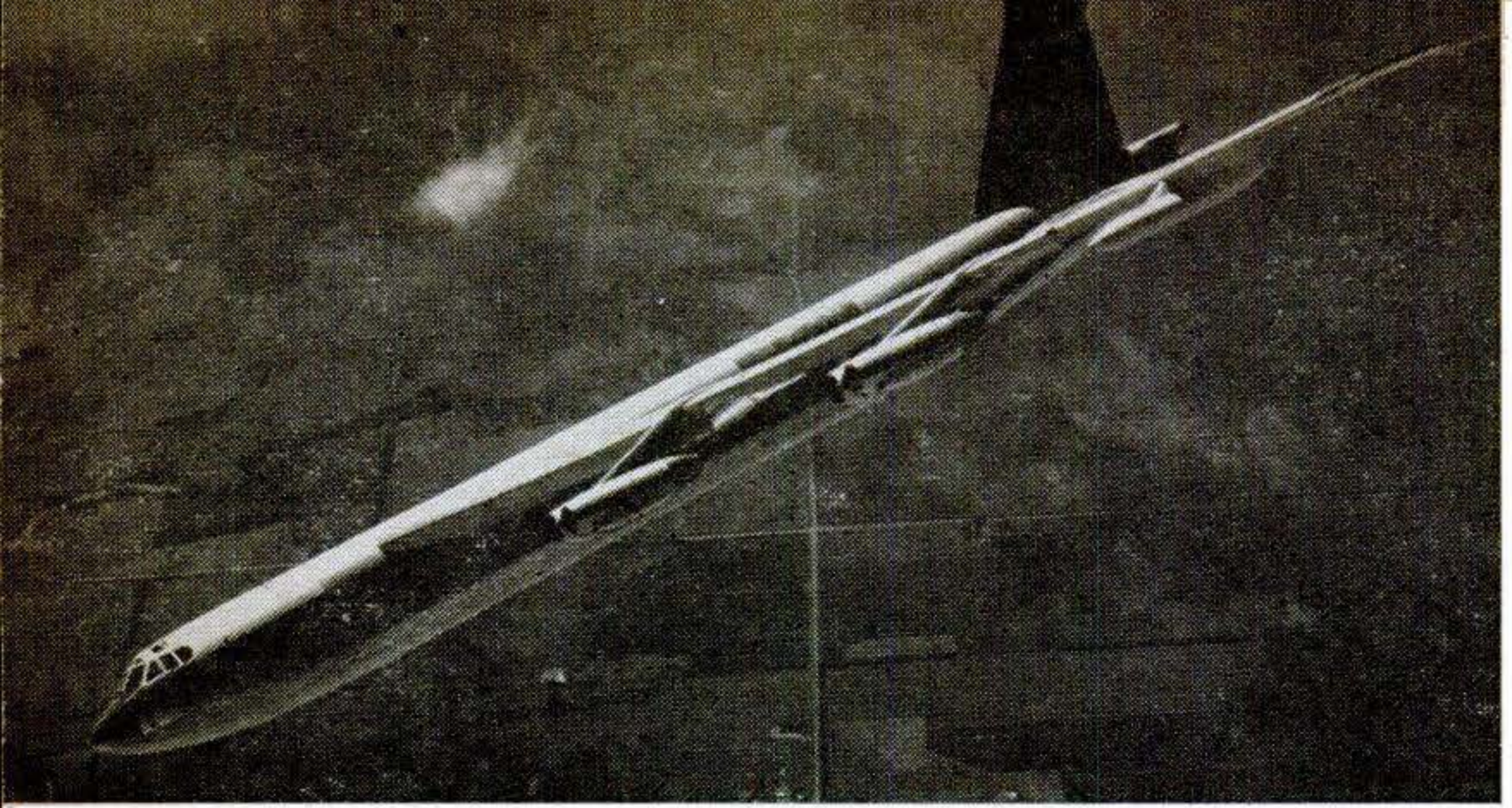
**BOOM EXTENDED,** a Strategic Air Command KC-135 tanker prepares to receive a B-52 jet bomber for a refueling hookup. A miscalculation can cause the two planes to collide, or the boom to break. Tanker totes fuel for transfer in both wings and fuselage. Nominal 15-ton transfer would run a car—if the stuff would burn in an automobile engine—for 75,000 miles.

**MAKING THE HOOKUP.** Photos show (left) bomber gliding toward "envelope" area. Tanker's boom operator, lying prone, "flies" boom by its wing-like projections to fuel inlet atop bomber's fuselage, six feet behind windshield. Semiconical receiver guides boom's nozzle in to a point where hydraulic levers seize it. Tension causes levers to release the nozzle.

CONTINUED



Copyrighted material



**BOEING B-52G** is the latest of SAC's jet bombers. With full fuel load, it weighs 244 tons, four times as much as a jet airliner. Plane has flown 10,000 miles without refueling. With refueling, its range is limited only by physical endurance of crew. SAC completes 140,000 fueling hookups a year—more than one each three minutes, day and night.

definitely know there's a lot of airplane behind you. One pilot said it was like "sitting in your living room, flying your house." Its handling won't be affected much by the 15 tons of fuel that we're going to take on. It starts getting touchy at around 400,000 pounds and today we weigh only 300,000.

I've throttled back so that I'm indicating 250 knots. The tanker's boom operator has the boom down and radios, "Tanker ready for contact."

I answer, "Receiver ready."

***Pulling in a little closer,*** I see the Pilot Director Lights. These are on a panel on the bottom of the tanker, just forward of the wing. Two rows of red and green lights controlled by the boom tell me to fly up or down, fore or aft.

Here's my problem: To make contact with the tanker, I have to maneuver the nose of my 150 tons of airplane into a narrowly limited area immediately below and behind the tanker. This area, called the "envelope," measures only 12 feet long, 14 feet high, and 21 feet wide. Try it—whizzing along at 300 miles an hour.

***The envelope has walls.*** They're just invisible. If I don't keep the bomber within these walls, the tanker's boom will automatically disconnect to keep it from getting damaged.

Keeping the 52's nose in the envelope wouldn't be simple under any circumstances, but there's an added complication. The tanker's slipstream creates a strong downdraft in the area of contact. So I have to trim into a nose-high attitude. This is no great problem, except that if I get just a little too far forward, the 52 will go out of the downwash and will zoom up. Unless I shove the control column forward and pull back the throttles fast, we'll collide. In a perfectly normal hookup, tanker and bomber frequently come within 25 feet of each other during refueling.

***Moving into the contact position,*** I aim for the end of the boom and slowly pull forward. The boom operator raises the boom to clear my windshield. The turbulence and downwash are increasing and the tanker seems to be hopping around like a pea in a whistle. The boom operator talks me in: "Forward ten, up four—forward five, up two—stand by for contact—contact tanker."

But I'm going too fast. The boomer warns me, "Back two—back four—disconnect."

***Clenching the wheel tighter,*** I force my plane back into contact. Twice I had sailed right through the contact position, but moving so fast the boomer didn't have a chance to stick the boom in. I'm dripping sweat. My breath is rasping against my oxygen mask.

Now I'm dropping too far back in the envelope. At the first sign of slipping back, I ease the throttles forward a little, then a little more, then a lot, but it's too late. The boomer directs, "Forward three—forward five—you're approaching the outer limit—disconnect."

"Here, let me show you," Penzien says patiently.

He takes the ship and jockeys it in. "I'll show you the limits," he says. He slides from side to side, just to the limits, but not quite far enough to disconnect. Then he touches the upper, lower, fore, and aft limits. It's as if the envelope had walls that we couldn't penetrate. He makes it look easy.

"Okay," he says. "Now try it again.

[Continued on page 220]

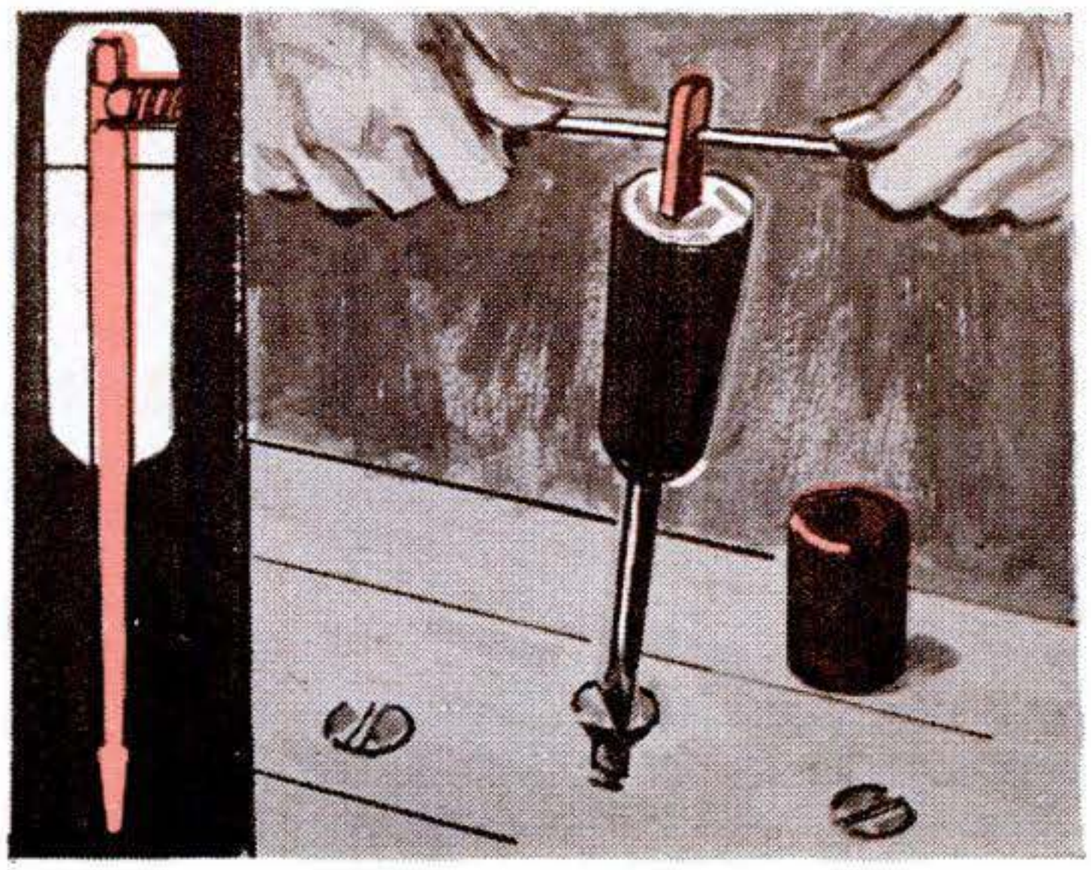


Copyrighted material

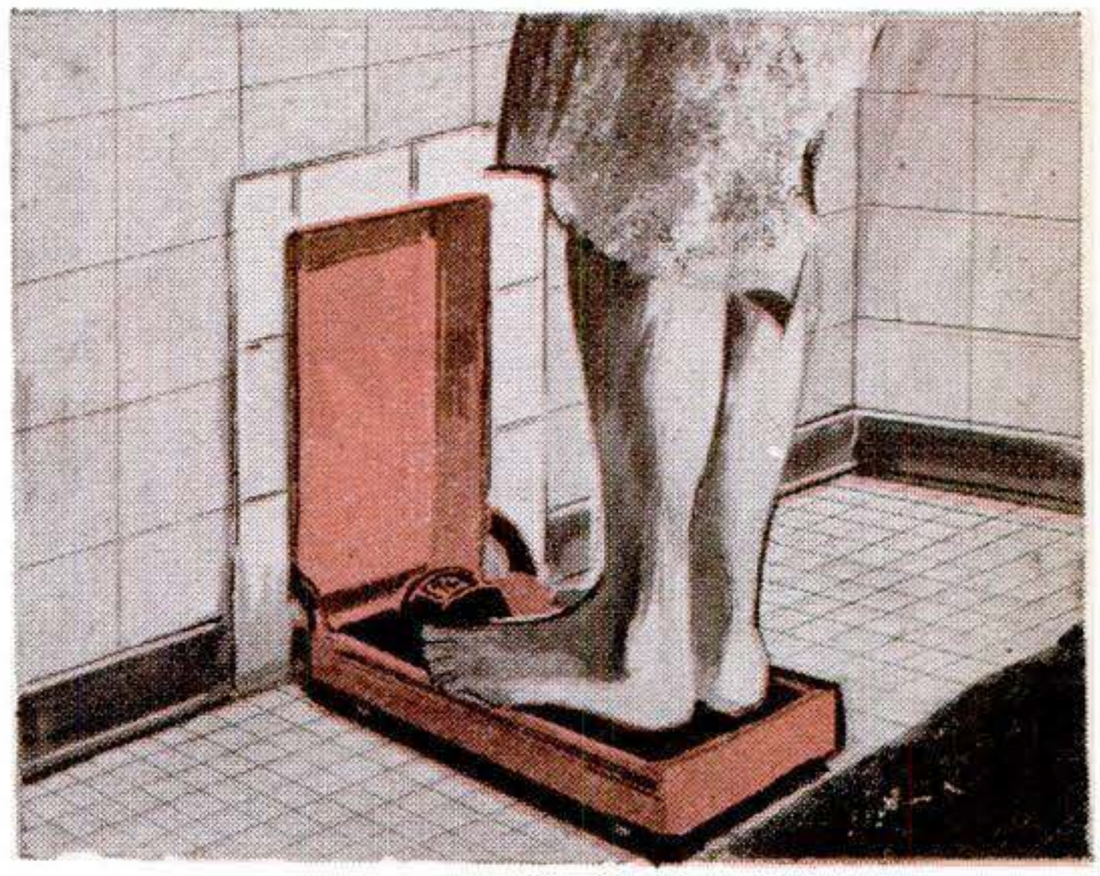
# New Ideas from the Inventors

**Swing-Up Wall Broadens View.** Both the look and outlook of your house could change with the weather if it had a disappearing wall like this. A motor would lift this recently patented, rail-mounted wall, then pull it back under the roof overhang. Pictures and ornaments on the wall would travel undisturbed.

**Driver Shank Takes Extra Twist.** If tightening—or loosening—a screw needed more torque than you could apply in the usual way, you'd snap the spring-held cap off the end of this driver handle. You could then turn the squared shank with a wrench or, as shown, by inserting a rod.



**Scale Folds Into Bathroom Wall.** Built into the base of a wall, this let-down bathroom scale would be handier to use than most, yet wouldn't take up any floor space. The bottom of the scale and the edges of the recessed frame could be tiled or masked to match any wall.

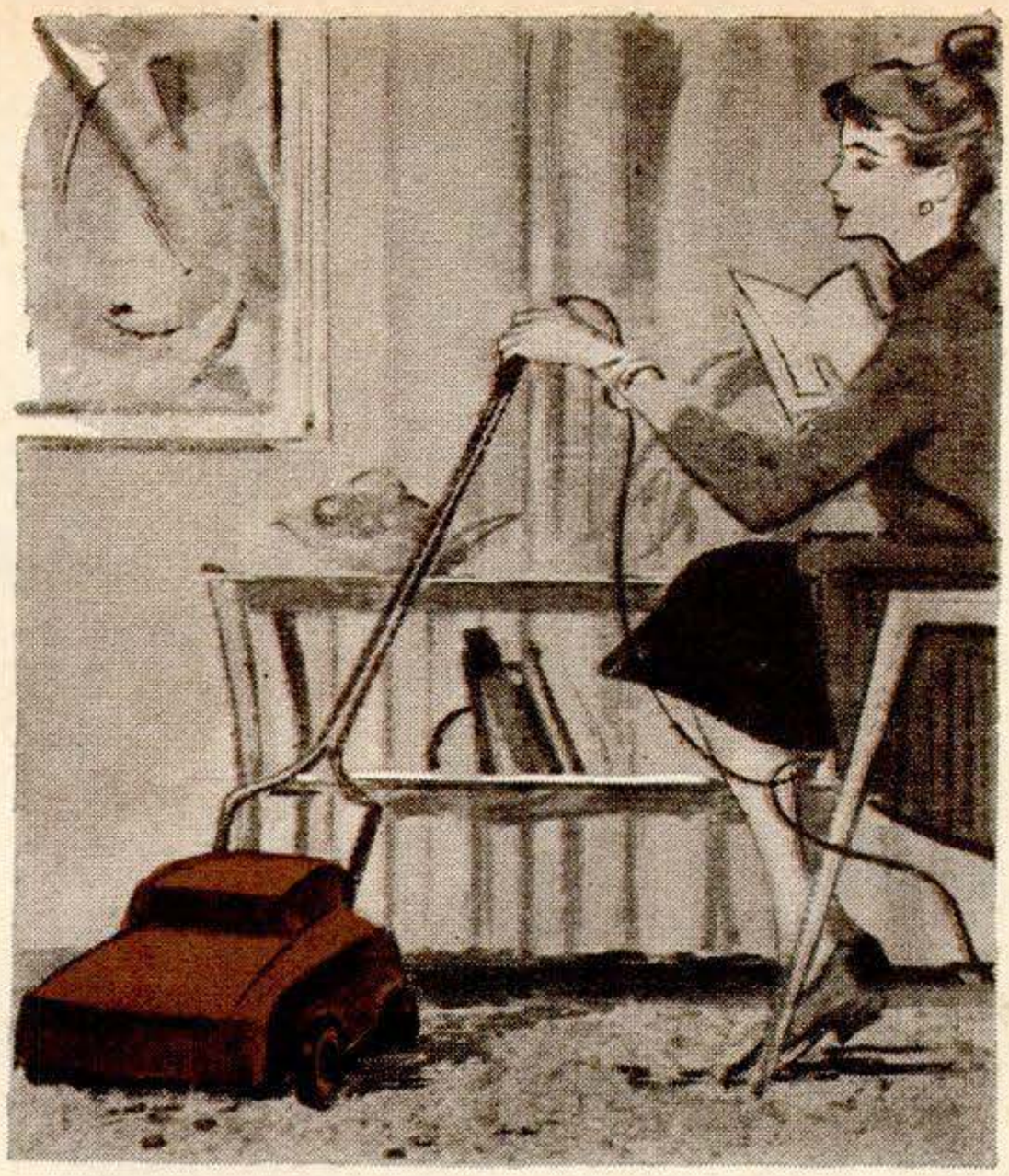


CONTINUED



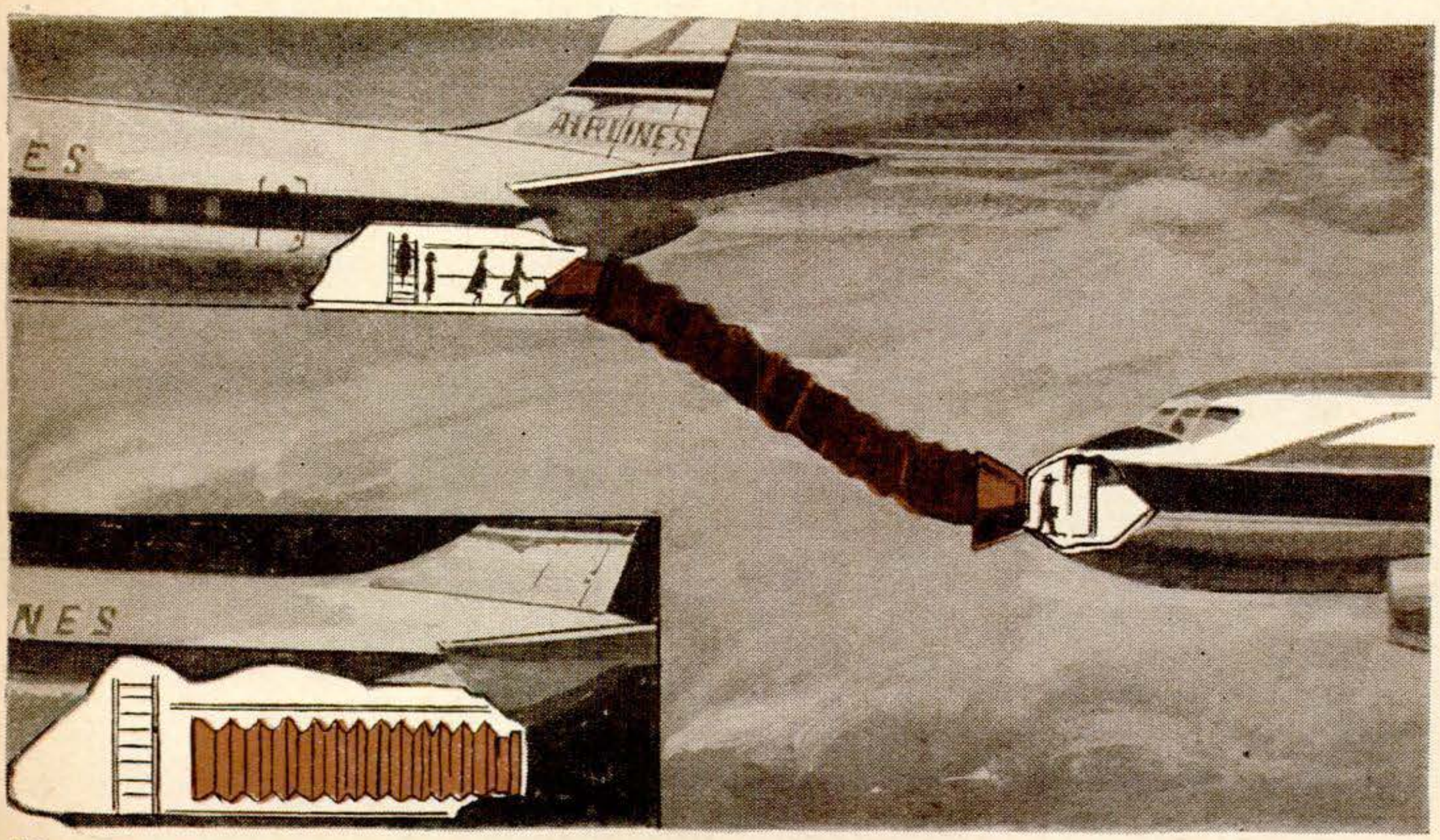
Copyrighted material

**Tackle Box Doubles as Float.** Airtight double walls on this tackle box might protect you as well as its contents. If the box tipped out of a boat, it would right itself, stay afloat so you could find it. If you went over, too, you could use the buoyant box as a life preserver.



**Vacuum Cleaner Wheels Itself.** A woman's work may never be done, but it might be made easier by this vacuum cleaner. Instead of pushing or pulling it over a rug, a housewife would just rock the handle gently. Drive wheels, belted to the motor, would do the rest.

**Corridor Links Planes in Flight.** With airliners fitted to carry—and receive—this extensible, people-sized tube, passengers could change planes safely if a pilot, say, anticipated danger in landing. Or it could speed air travel by allowing passengers to make scheduled changes from plane to plane in mid-air.

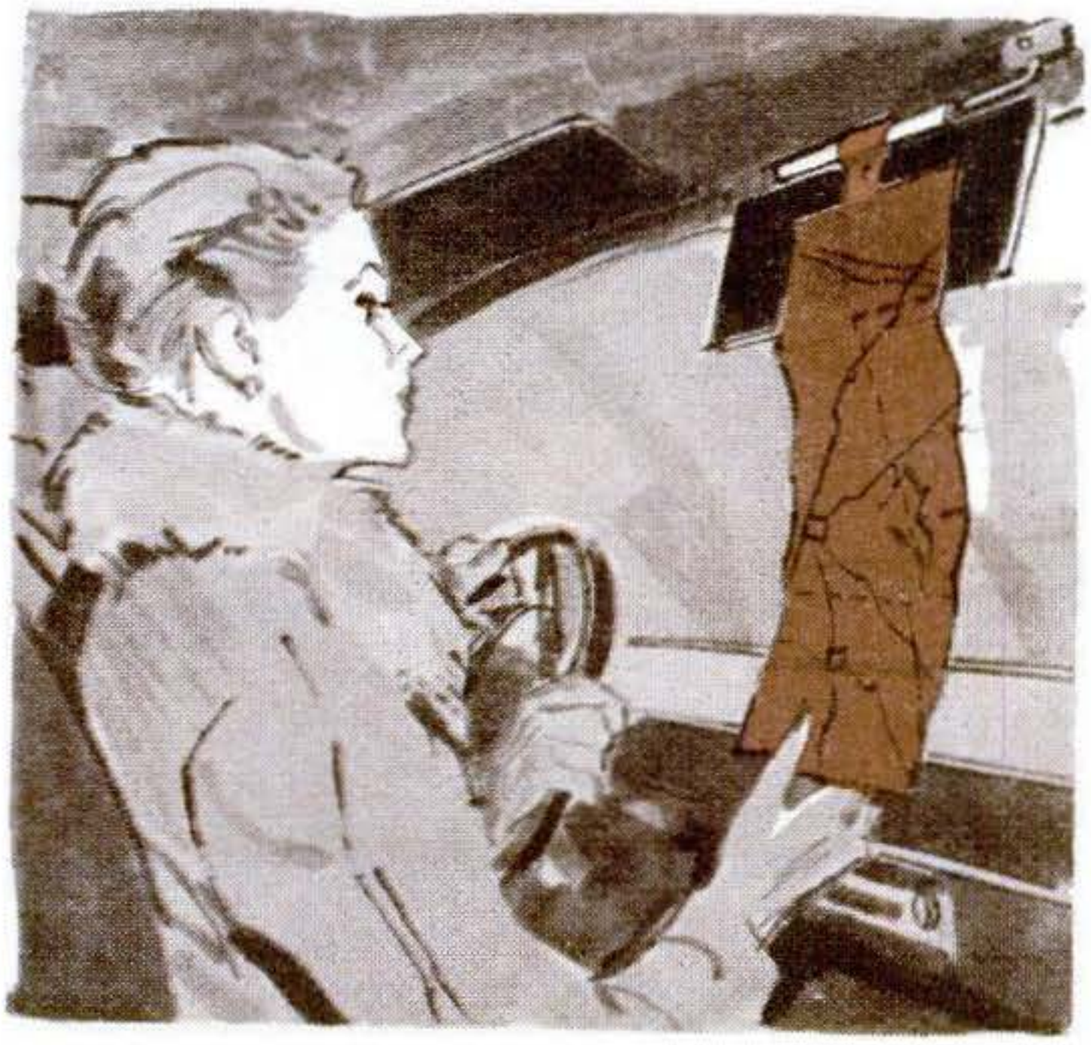





Copyrighted material

**Sheet Frame Speeds Bedmaking.** You could make a bed without walking around it—or pulling it out from the wall—if it had this hinged, mattress-fitting frame. To fix the far side, you'd lift the frame, tuck sheets and blankets under clips, then flop it back in place.

**Visor Holder Unfolds Maps.** You wouldn't have to wrestle with road maps on the way if you arranged them, in advance, in this visor-mounted, transparent-plastic holder. Made of precreased plastic sheets, it could be unfolded or turned to display any part. It would quickly repleat itself along the crease lines, so you could fold it up under the visor.



**Propless Pump Drives Outboard.** Instead of pushing water with a submerged screw propeller, this outboard unit would use a centrifugal pump linked directly to the engine. Thrust would be generated by water drawn through an inlet tube and then jetted through a rear-facing outlet.

*The following patents have been issued on these inventions:* **Swing-up wall**—*No. 2,941,794 to N. Bel Geddes, NYC;* **Screwdriver**—*No. 2,825,374 to A. Reid, Galconda, Nev.;* **Scale**—*No. D 183,069 to W. Spear, Cincinnati;* **Tackle box**—*No. 2,811,276 to H. Ray, Mobile, Ala.;* **Vacuum cleaner**—*No. 2,950,772 to C. and F. Dostal, Great Neck, N.Y.;* **Plane corridor**—*No. 2,942,816 to P. Dostie, Quebec, Canada;* **Bedmaker**—*No. 2,947,008 to E. Wild, Zurich, Switzerland;* **Map rack**—*No. 2,825,988 to H. O'Reilly, NYC;* **Outboard**—*No. 2,943,593 to K. Megert Jr., and J. Line, Lubbock, Tex.*

*Copies of patents may be ordered, by number, from the Commissioner of Patents, Washington 25, D.C., at 25 cents each; Design (D) patents are 10 cents. To write to an inventor, if the address given above is insufficient, you may address him (by name and patent number) in care of the Commissioner of Patents.*

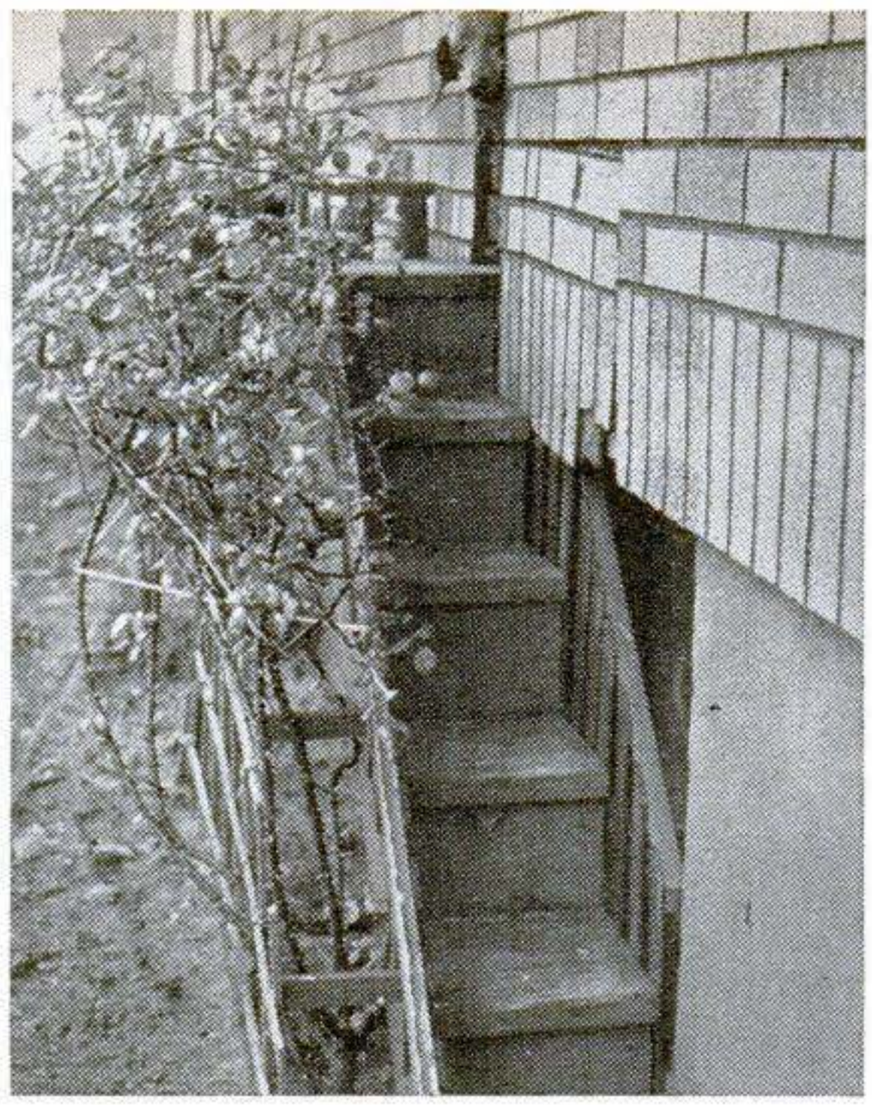


Copyrighted material

## Lets the sun heat his house

The southwest roof and side of this Washington, D. C., home is a heat trap built of insulation material, black corrugated sheet metal, transparent plastic, and glass. Water, circulated to a collector at top, runs down into a heat-storage tank that occupies a third of the basement and is large enough to retain its heat during a 10-day cloudy period. Night air cools the water in summer.

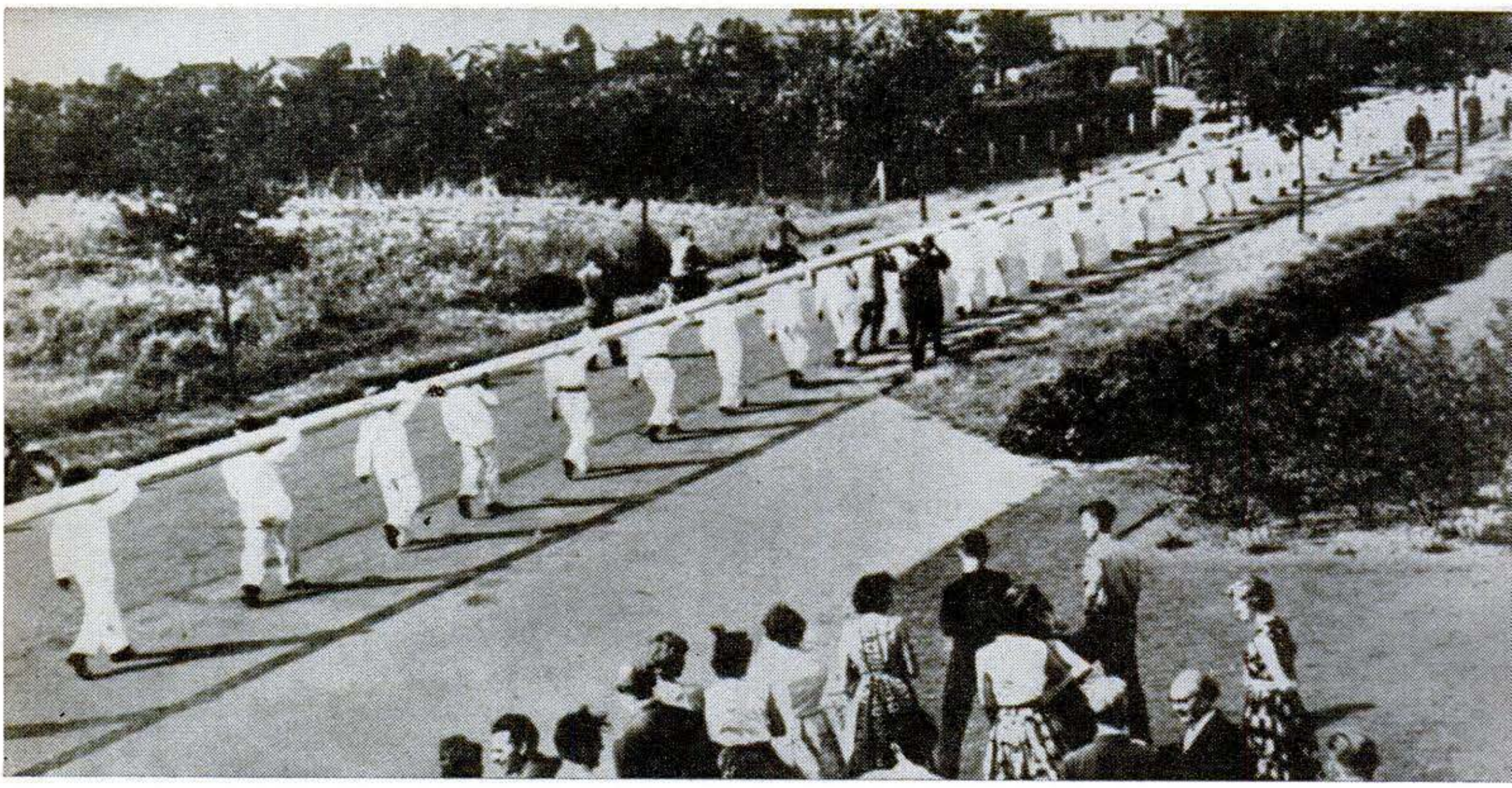
Harry E. Thomason, a patent adviser in the U. S. Signal Corps, designed and installed the heating-cooling system for $2,500. He figures his winter's fuel bill for supplemental heat at $4.65.



## Private entrance

These stairs were built for a dog. They lead from a Brooklyn, N. Y., back yard to a dachshund-height door and the kitchen of his master, William Brickman.

Fritz, who peers around a corner above, has an eye peeled for cats and other trespassers.



## Parade of workmen transport record-length pipe

This 350-foot plastic pipe is hand-toted by 55 men to the railroad freight yards in Hardenberg, Holland, for loading on nine flatcars that took it 150 miles to Rotterdam. There the pipe will carry off salt water brought up with oil from wells. It had to be in one piece to avoid leakage in surrounding farm land.

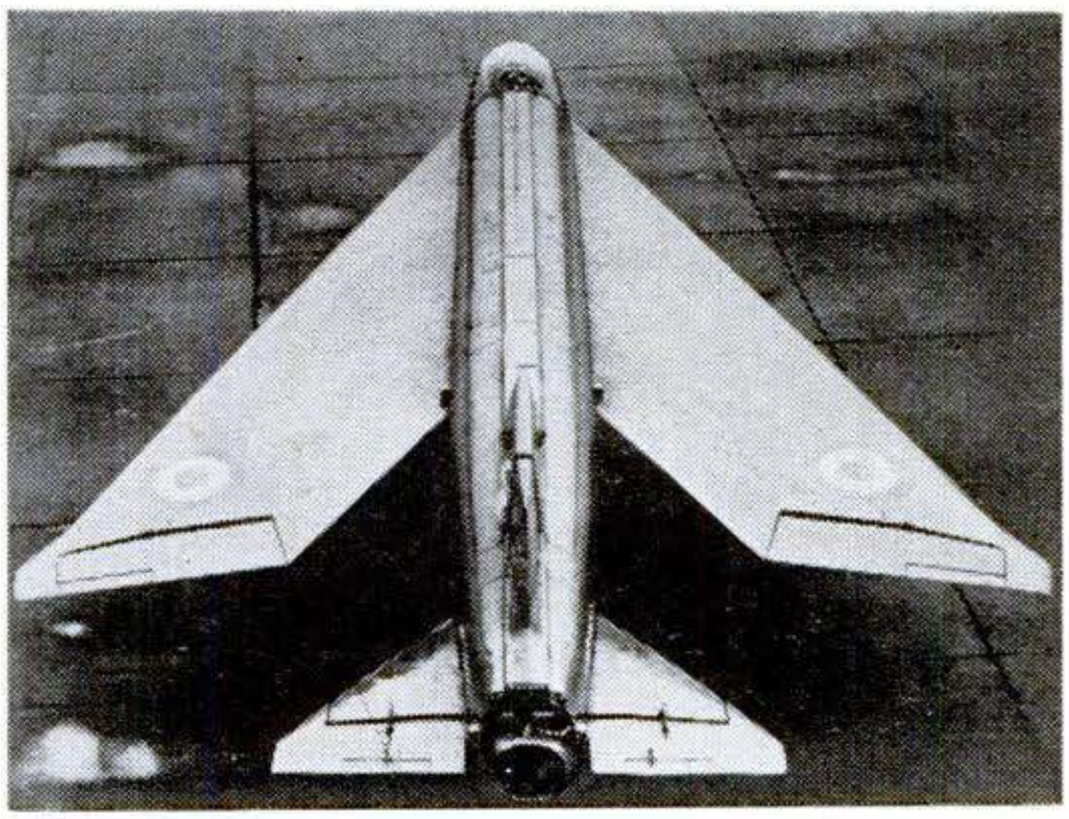
Before the long pipe was finished, it stretched through a hole knocked in the factory wall, out of the yard, over a hen run, and into a farmer's barley field.



Copyrighted material

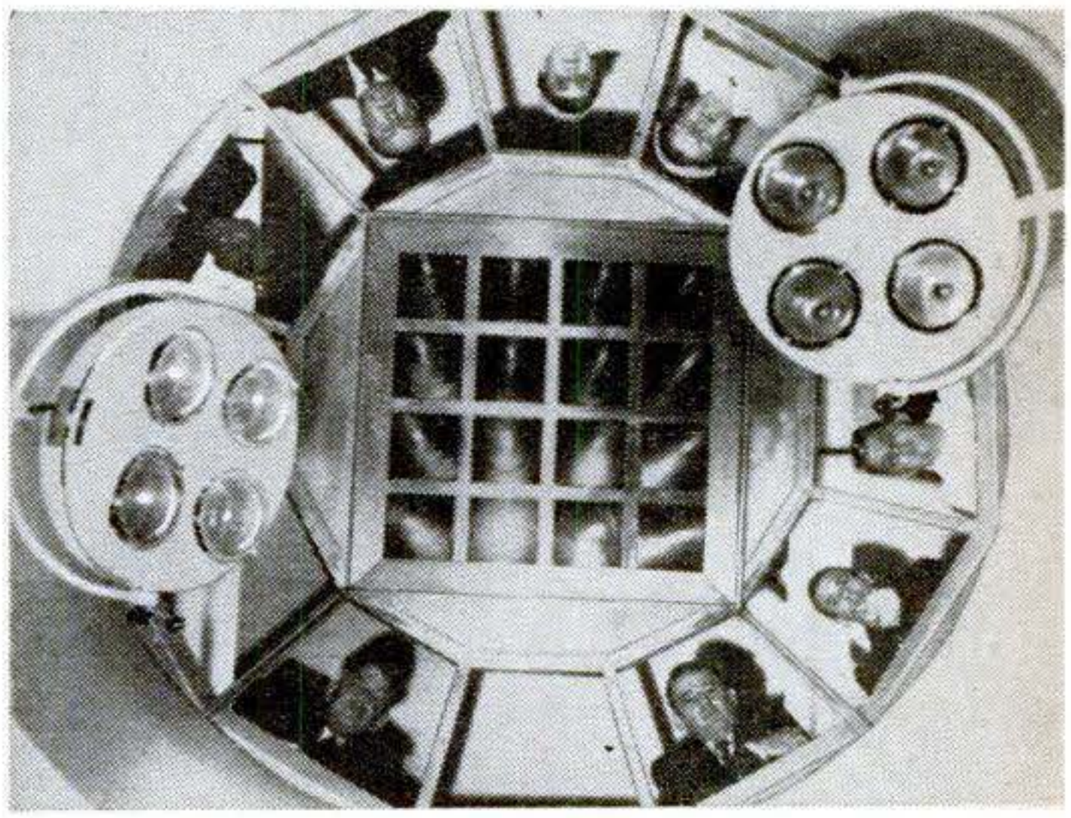
## Repair shop travels over the road

This mobile workshop houses generator, air compressor, lathe, drill, grinder, cutting and welding equipment, overhead hoisting beam, and battery charger. It's made in Britain for the armed forces of Ghana, Nigeria, Ceylon, Malaya, and Sudan. It can be supplied as a trailer, as above, or mounted on a truck chassis.



### Most sweptback wing

This British Short SB-5 jet has adjustable wings. It set a new record when it flew with them swept back at an angle of 69 degrees, as shown here. This is a greater sweepback than that of any other plane now known to be in the air.



### Operation eye-view

An observation dome above the operating room in a new research annex of Chicago's Presbyterian-St. Luke's Hospital lets doctors and nurses watch interesting operations. Some of the hanging floodlights are adjustable for better vision.

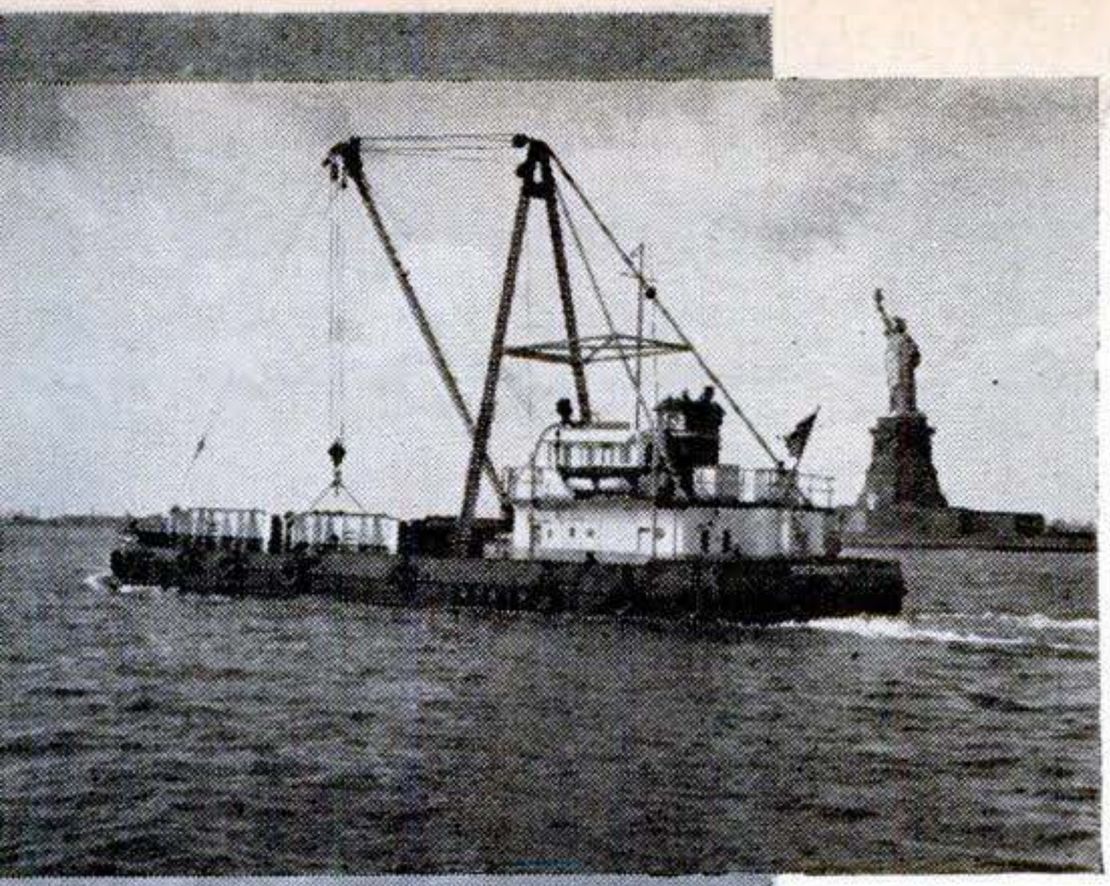


Copyrighted material

**DRIFTMASTER,** a floating carpet sweeper, bears down on a streak of drift in New York Harbor. Nets stretched between the twin hulls will gulp the seagoing debris. The Driftmaster can collect up to 56 tons of debris each day. Harbor drift can sink small craft and cripple giant liners.



Copyrighted material



# They Bait Their Nets for Junk

***Anything that floats can—and usually does—find its way into the steel-trap nets of the Driftmaster***

**By Richard Petrow** PS PHOTOS BY W. W. MORRIS

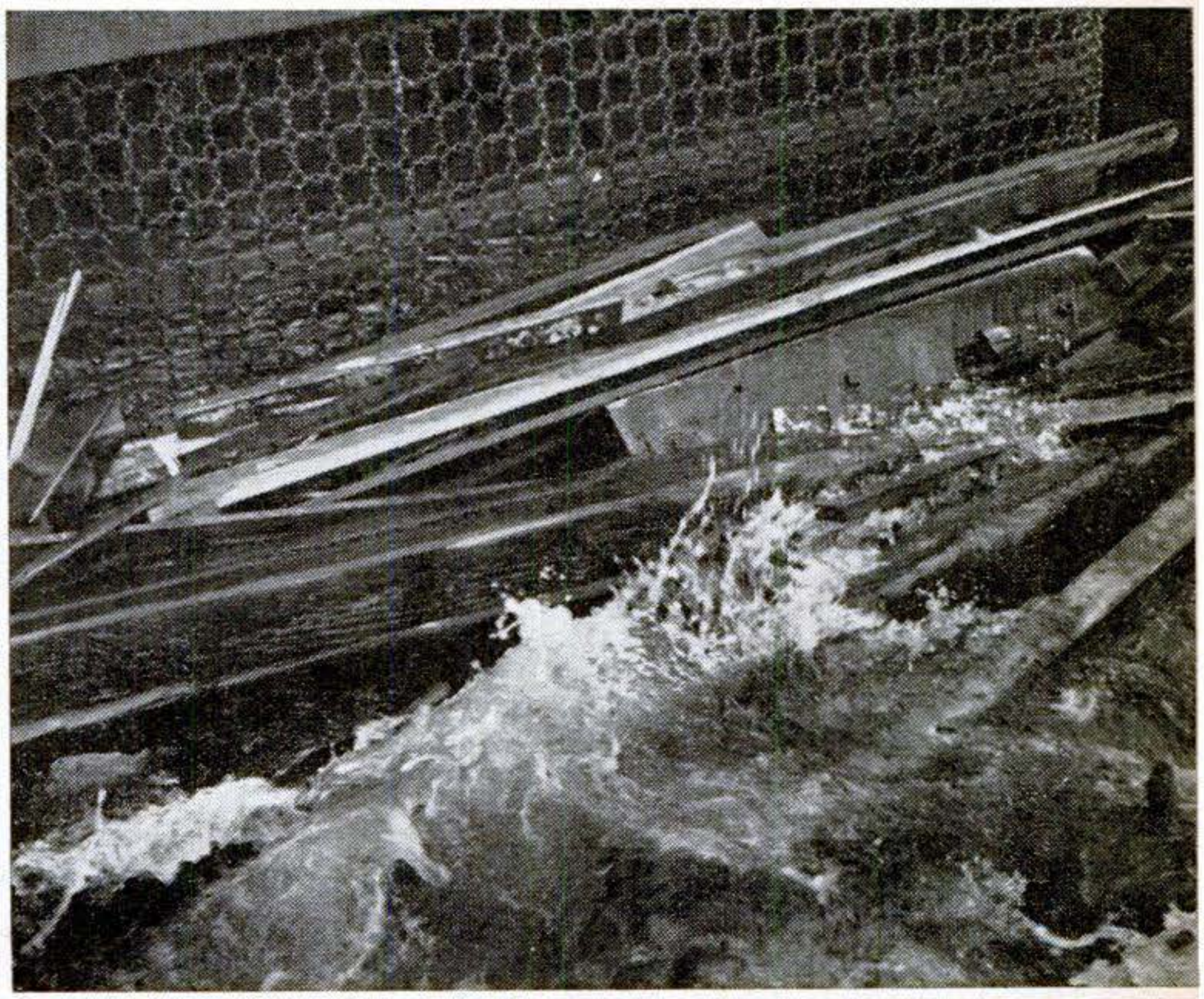
A RIDE aboard the Driftmaster is a nautical experience you don't soon forget.

The 100-foot, twin-screw, diesel-powered catamaran operated by the U.S. Army Corps of Engineers is the only vessel of her kind in the world. Her mission is unusual: to keep the world's busiest harbor clean of dangerous debris. Like a fussy housewife, the Driftmaster roams New York's harbor searching for it.

One bleak winter day I rode the Driftmaster with Bill Morris, chief photographer for POPULAR SCIENCE. It was a day the craft almost choked hauling aboard a piece of flotsam so big it could have stove in the hull of any vessel afloat.

It was cold and foggy when the Driftmaster poked her bow alongside a pier at the foot of Manhattan to pick us up.

"You're in luck," said Chief Bosun Edward Barsley. "The

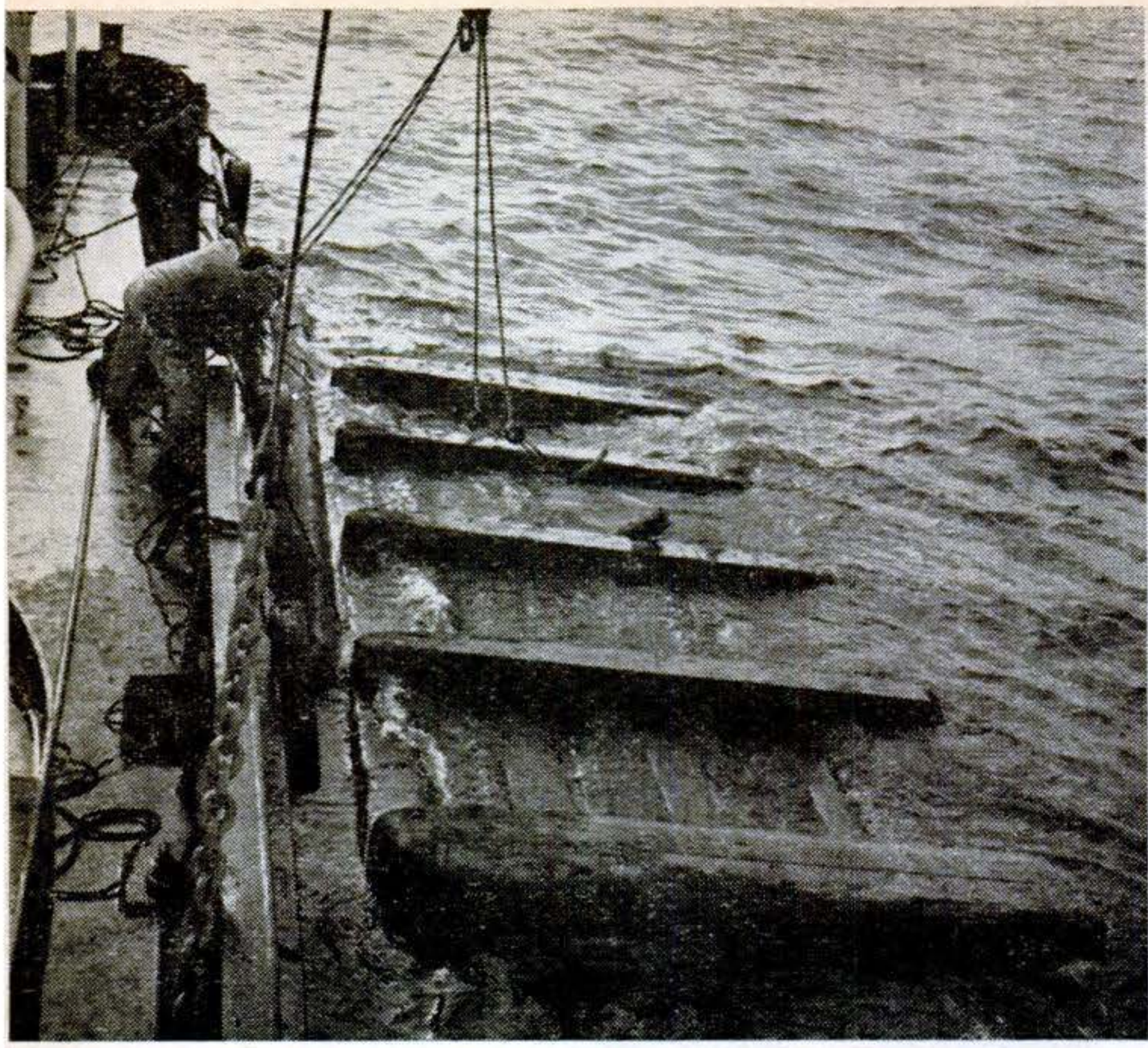


**NAUTICAL SPLINTERS** are battered by waves after being caught in nets. Vessel has two steel-chain nets, 18 feet wide, 40 feet long.

CONTINUED



Copyrighted material



**DEADLY PIECE** of flotsam is brought alongside. This drift, part of an old pier, could stave in the hull of any vessel afloat.

**DECK BOOM** lifts drift and swings it over deck as crewman

tide's ebbing. We should pick up a lot of drift."

The Driftmaster's twin hulls have no structural members between them. Water can rush through the hull tunnel, passing under the vessel from bow to stern. And so can anything that floats. To trap debris, the Driftmaster stretches steel-chain nets between its parallel hulls.

**SKIPPER** of the Driftmaster, Capt. John A. Noonan, works levers in pilot house that control boom action. Noonan is a sea-wise pilot who likes to wait in ambush for harbor drift.

The skipper, Capt. John A. Noonan, was in the bridge house, one hand resting on the wheel, the other wrapped around a mug of strong black coffee. Noonan is a weather-bitten harbor pilot with an uncanny knowledge of how tides and winds affect harbor drift.

He unrolled a chart and stubbed his forefinger at the Narrows.

"That's where we're headed," he said. "Sooner or later everything in the harbor will drift through the Narrows toward the Atlantic."

A slow grin creased his face. "I usually wait in ambush for it."

"What kind of drift are we after?" I asked.

"We pick up anything afloat that could be considered a menace to shipping," the skipper answered. "Most of it is scrap lumber, but you can pick up practically anything."

As we moved down the bay at a steady seven knots, Noonan told us that the drift problem in New York harbor causes well over a million dollars' damage to vessels each year. "Even the Driftmaster isn't immune. At least four times a year we go into drydock for a new propeller."



Copyrighted material

keeps a safe distance. Ten-ton drift caused ship to list sharply.

**CARPET-SWEEPING** operations continue after giant piece of a drifting pier has been secured across the forward deck.

***The hunting grounds.*** The fog had lifted and the sun was trying to break through when the Driftmaster reached her happy hunting grounds in the Narrows. Noonan scanned the water with a pair of binoculars, then gave a grunt of satisfaction. He had spotted a "streak."

"In this harbor," he said, "drift accumulates in streaks, along the tide rips."

We were within 100 yards of the streak when Noonan ordered the forward net lowered. Two deck hands, wielding 16-foot pike poles, took posts on a crosswalk in the bow. Noonan bore down on the streak so that most of it would pass between the twin hulls and sail right into the net.

The drift began entering the net, first a few pieces at a time; then, as the center of the streak was reached, in a rush of jagged wood. The net filled steadily.

For the next 20 minutes, I jotted down some of the items that came aboard.

"Truck tire, casing cracked, 10:49 a.m.," my notes began. "Bottom of a bed; scrap lumber; oil-covered whisky bottle (empty); metal refrigerator (without motor); paint bucket; scrap lumber; rocking chair; barrel; vegetable crates; body of large white mongrel dog; cable reel; water-logged piling (crew calls them 'sinkers'—most dangerous); child's beach ball; cushion; book; beach chair; hat boxes; more lumber; blackened life ring; sign ('detour'); a door . . ."

"Sometimes the stuff we haul aboard is valuable," Barsley said. "A tug once hit a barge loaded with oil. We picked up 200 barrels that day. We reported it to our main office, and they saw that the oil was returned to its lawful owner."

Barsley paused, grimaced, and added: "We also get about three or four corpses a year. When that happens, we stop all operations and call the police."

Perhaps the most unusual haul was 16 dozen brassieres a sharp-eyed deck hand spotted in the nets last year. They were soaked but salvageable. For a few days, Barsley recalls, there were 192 brassieres drying in the engine room.

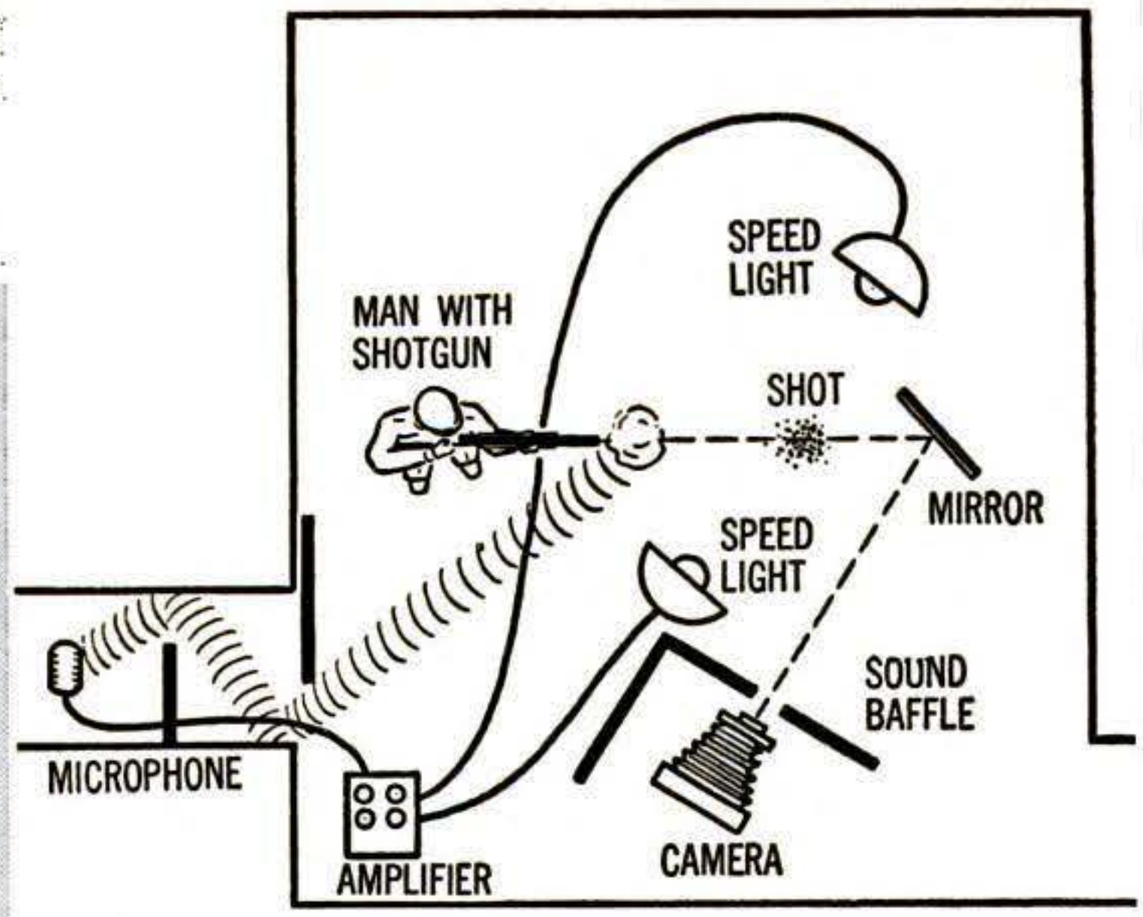
***Danger ahead.*** I went back to the pilot house with Capt. Noonan. The Driftmaster was continuing routine carpet-sweeping when one of the deck hands pointed toward the main channel. Noonan grabbed his glasses and let out a long low whistle. About 500 yards off our bow, and right smack in the main shipping channel, was a complete section of a pier, riding low in the water like an iceberg. When we ap-

[Continued on page 222]



Copyrighted material

Shotgun blast appears aimed at camera.




Here's how photo was taken.

## In front of a shotgun blast

Ever wonder what a shotgun blast would look like headed directly for you?

When Gardner Advertising Co. needed the photo at left to illustrate an ad for Monsanto Chemical Co., its photographer didn't risk having his camera shattered by pellets. He took it through a mirror, rigging his lights to an amplifier so they would flash with the sound of the shot.

## Convertible scooter

This British three-wheel cabin scooter with detachable canopy seats a passenger or provides modest cargo space. A two-cycle engine drives the front wheel and swivels with the steering. The Nobletta cruises at 40 m.p.h. and gets 130 miles per gallon. York Noble Industries, Ltd., London, makes it. Price is about $275.

## Handy car-door pocket

This attachment is designed for a door of the Renault Dauphine. It can be fastened to the base of the inside door panel with self-tapping screws. The roomy pocket is made of toughened plastic with bright metallic trim, provides easy-to-reach storage for groceries, cameras, books, and other bulky items.



Copyrighted material

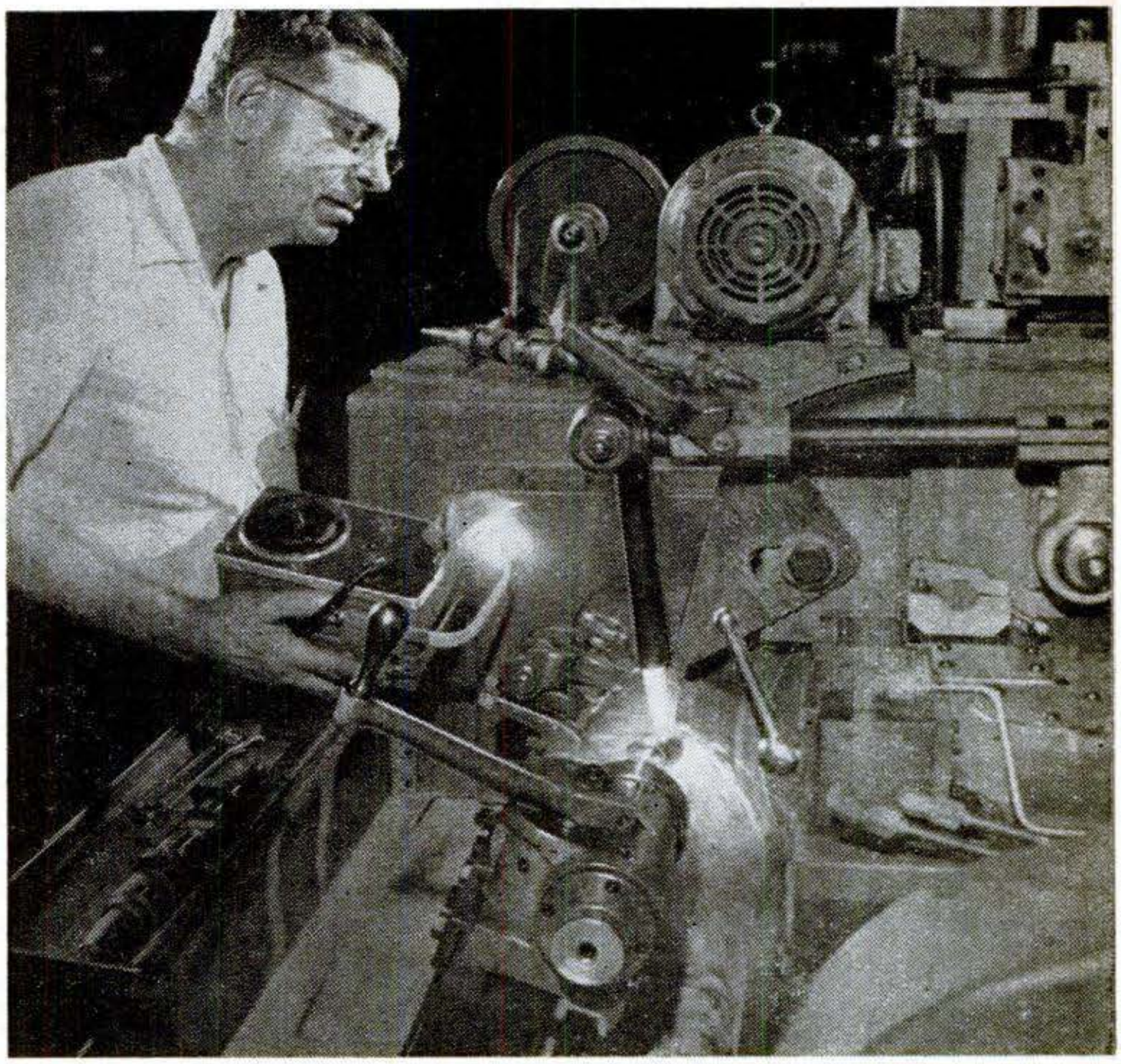
## Reindeer taxis meet incoming planes

Sleighs drawn by picturesque reindeer and driven by Lapps in native costumes await skiers and other tourists debarking from a Finnair Douglas DC-3 at Rovaniemi Airport in Lapland. The photo is from an *Aviation Week* correspondent.

### Stopping speed in its tracks

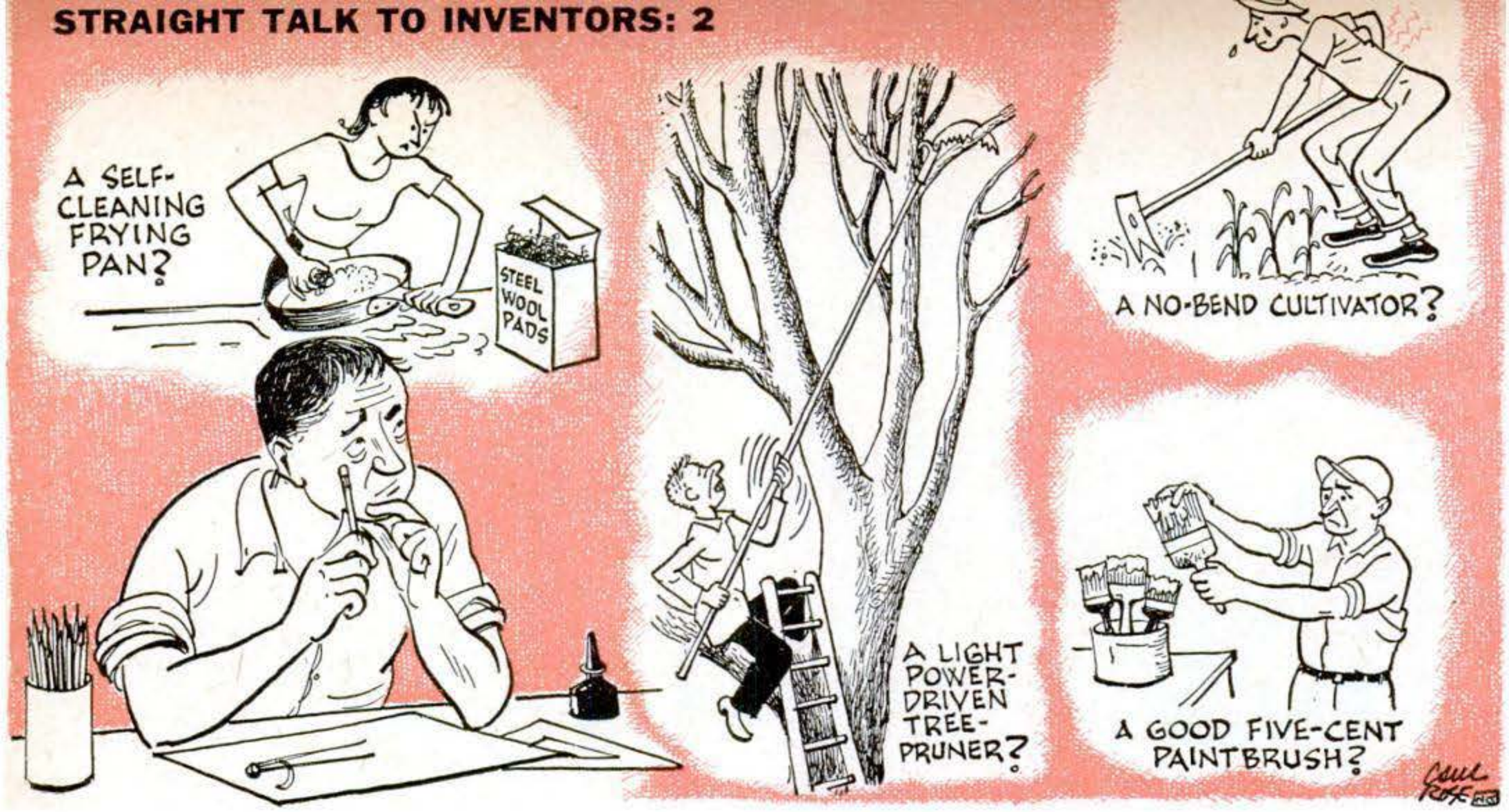
This machinist can see exactly what he's doing—as if the high-speed camshaft grinder were standing still—with this improved version of the stroboscope. It emits fantastically short flashes of brilliant white light. Synchronized with machine rotation, they make spinning parts appear stationary.

General Radio's new high-intensity Strobotac can make 25,000 flashes per minute, each lasting less than a millionth of a second. It uses a new flash tube developed by Edgerton, Germeshausen, and Grier to give a sharper view of moving parts.





Copyrighted material




# What Should You Invent?

*This is the second article in* POPULAR SCIENCE'S *series on the profits and pitfalls of inventing. Sure you can sell a new idea if it's good—see February PS —but what makes it good? The mystery is stripped away when you examine the rules professionals use to single out* what *to invent. You can use them, too, to make your inventions bring in money. Coming up next month is another inside story: How to protect your valuable ideas.*

**By Martin Mann**

THE formula for profitable inventions sounds simple. Listen to Jim Rand, one of the most successful of modern inventors:

"For an invention to make a profit it has to create a business. You can create a business if this invention is cheaper and just about as good as the previous product. You can start a business if it is better, even though it costs a little more. The jackpot is something cheaper and better."

Rand, besides being an inventor himself, is president of a Cleveland firm specializing in inventions. One of his men is Claud Foster, a saxophone player who first hit it big with the Gabriel Horn, an auto accessory that hooked onto the exhaust pipe and played "My Country 'Tis of Thee" at the push of a button. But Foster's specialty is making things cheaper. Years ago he took a hard look at shock absorbers, which are rather expensive.

One day he was driving down a country road and saw a farm boy secure a bull by wrapping its rope around a tree. "That's for me," he said, and adapted the idea to his Gabriel Snubber shock absorber.

The famous Charles Kettering leaned the other way to invent the self-starter. He saw that a great many could be sold, even though they cost much more than hand cranks. Boss Ket's mechanical genius showed up when he seized on a fact that other engineers, blinded by their experience with continuous-running trolley motors, had overlooked: A light-duty motor could be heavily overloaded to



Copyrighted material

crank an engine if it carried the load only briefly.

Either approach works—if the invention is one that enough people will pay enough money for. That's the point.

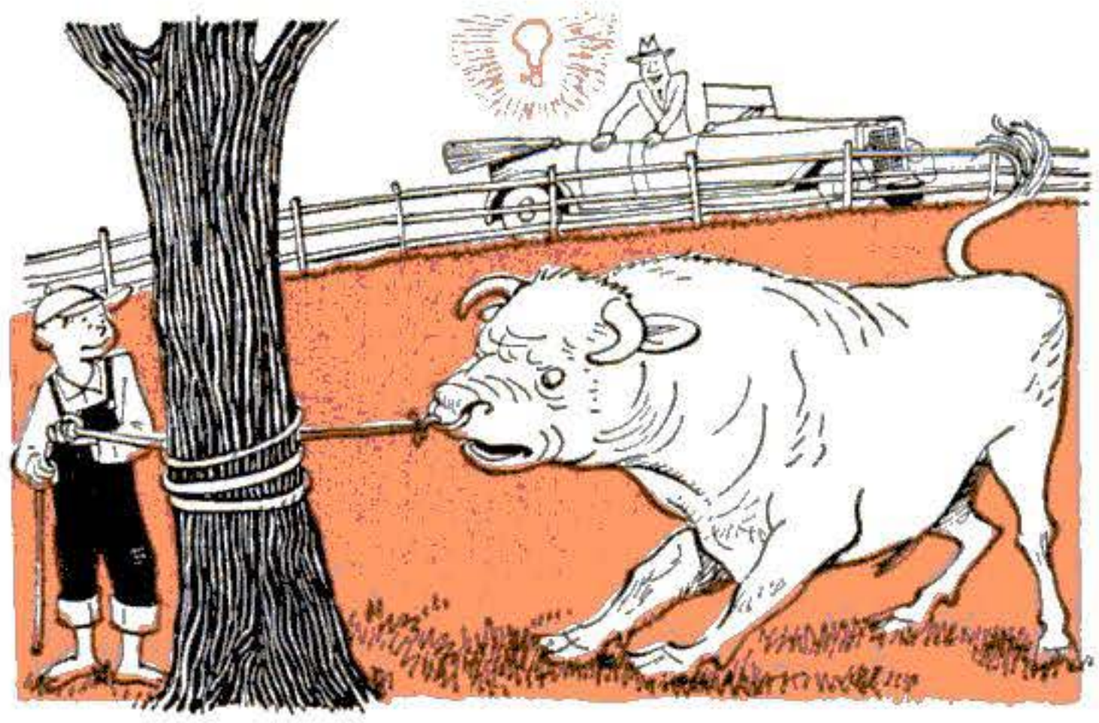
### Don't invent just for the sake of inventing

Most amateur inventors ignore this—and miss the pot of gold. "They do things backwards," says veteran consultant Charles Welling. "They jump right in, inventing away, just because they feel impelled to invent. They don't think about markets for their inventions until after the inventions are made. Then it's too late."

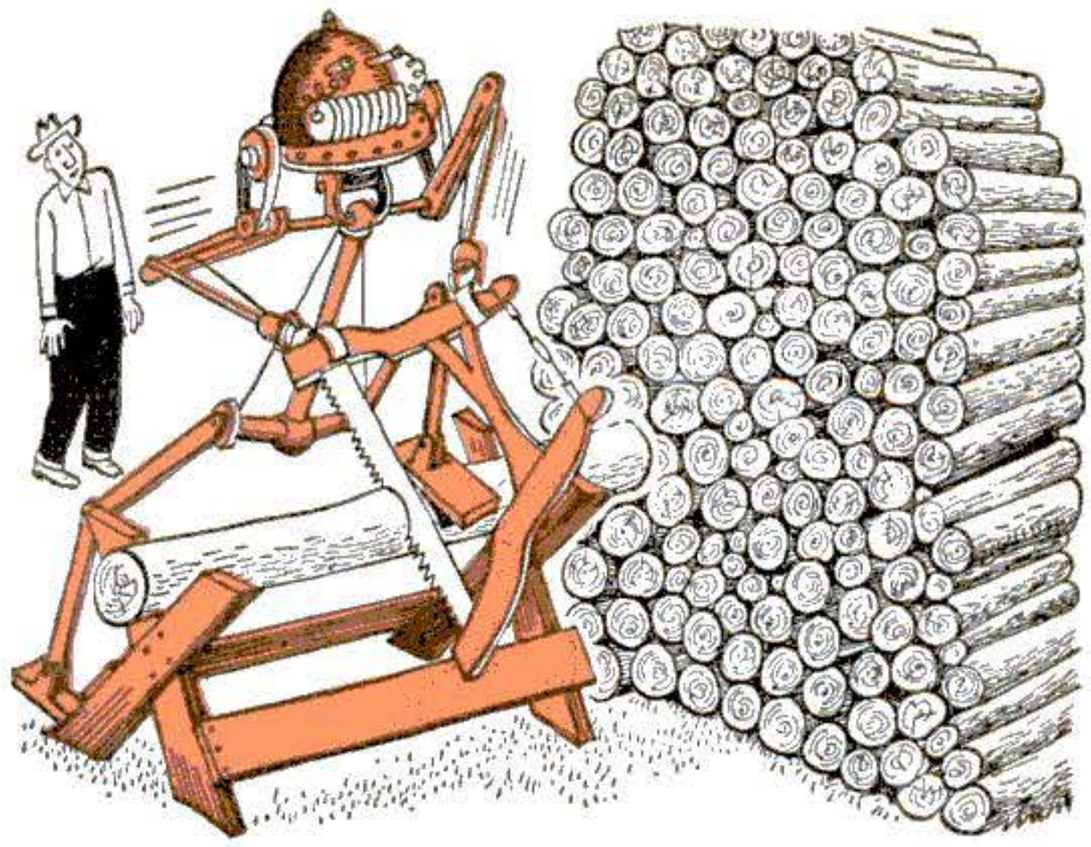
Welling tells of a fellow townsman who rigged up a mechanized bucksaw for cutting firewood. "It worked fine. He had used it for several years, and built a couple for friends. Then he came to me for advice on commercializing his invention. But he hadn't the foggiest idea of how many people might buy such a machine or how much they might be willing to pay for it, let alone what kinds of stores might sell it. He never got anywhere."

### How a new kind of machine was born

The big companies that earn dividends on new products do exactly the opposite. Take Harnischfeger Corp., the heavy-machinery manufacturers. At the end of World War II Harnischfeger worried about its crane business. So many cranes had been built during the war that there



*Foster watched a farm boy secure a bull by wrapping its rope around a tree. "That's for me," he said, and adapted the idea to his shock absorber.*



*He rigged up a mechanical bucksaw for cutting firewood. It worked fine —but he never got anywhere with it.*

seemed little chance to sell new ones for years to come. Welling was assigned to find a way to keep that division busy. Welling asked himself two questions:

1. Who are the division's customers? Obviously, big construction firms, the contractors who build highways and airports.

2. Where were these customers using hand labor? Hand labor is slow and costly. Replacing it, even with a fairly expensive machine, usually pays off.

Welling spotted the opportunity in soil stabilization: Harrows, trucks, and gangs with shovels were needed to beef up the dirt foundations under roads and runways.

Only at this point did mechanical inventing begin. Harnischfeger's engineering department got the word and duly produced an ugly but efficient single-pass soil stabilizer. Operated by one man, it munches its way across the landscape, churning up dirt, mixing in the required amount of stabilizing asphalt, and patting the strengthened soil back into place, all in one continuous operation.

As it turned out, Harnischfeger's crane business boomed instead of dying, but that hasn't made the profits on the soil stabilizer any less pleasant.

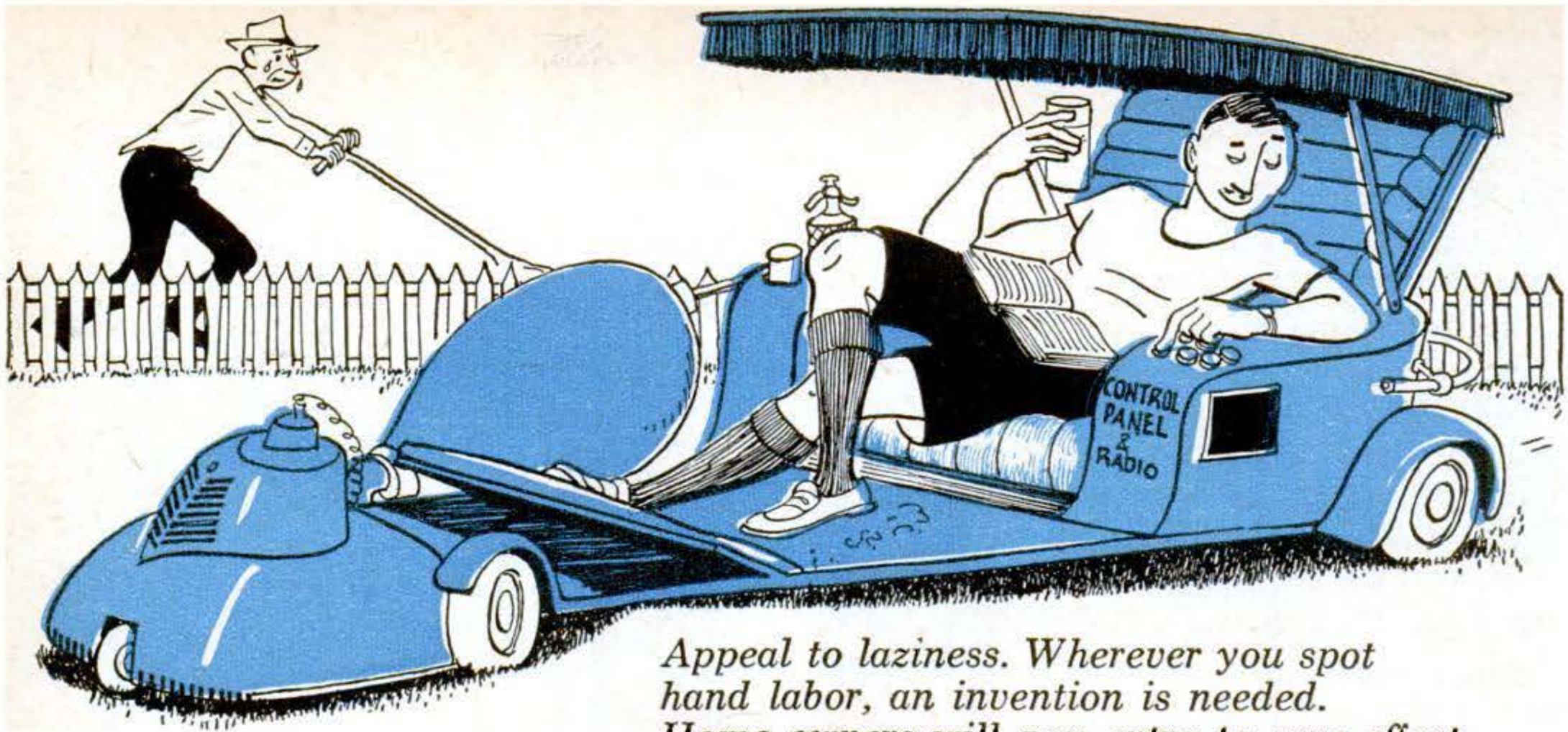
### So who needs it? Before you begin, stop and think

Inventing to please the customers instead of yourself is not always surefire, of course. The biggest corporations have blown millions on market studies only to

CONTINUED



Copyrighted material




*Appeal to laziness. Wherever you spot hand labor, an invention is needed. Home owners will pay extra to save effort.*

create monumental disasters (just ask Ford about the Edsel). Yet hard thinking before you invent does improve your chances greatly.

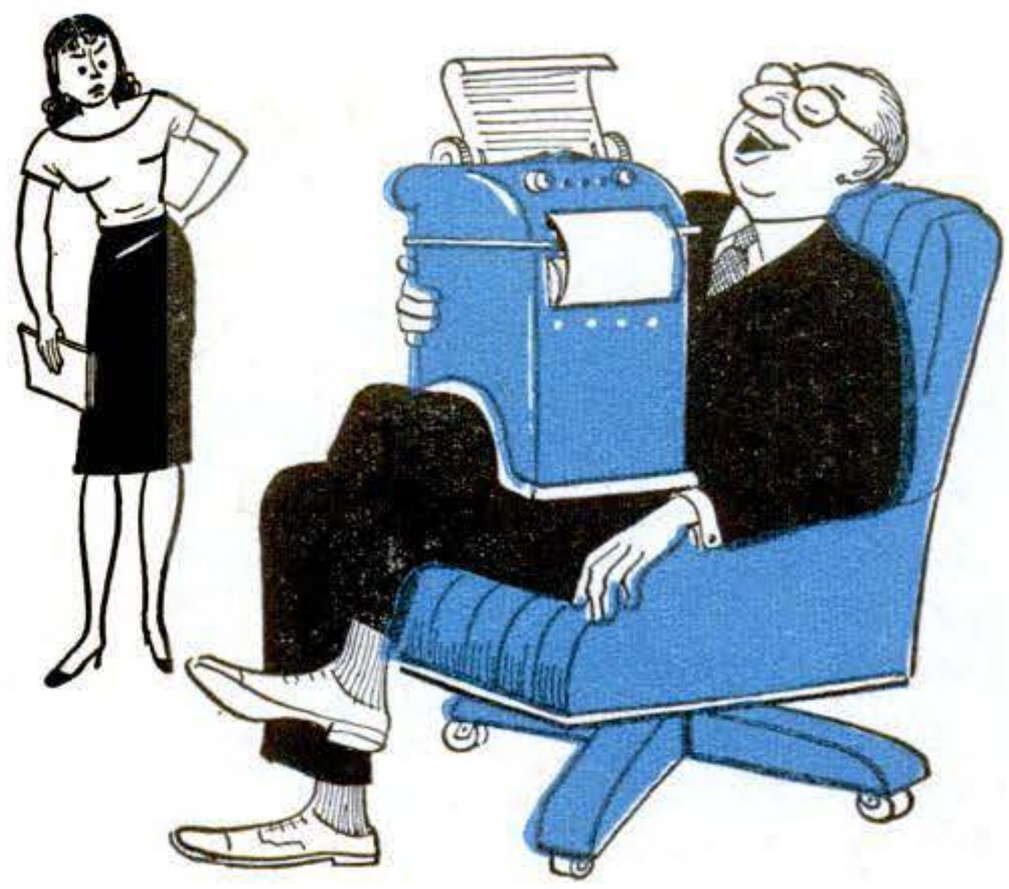
### Some hints from the experts on what to invent

The men who pay their rent with inventions have learned some rules the hard way. Here's what they do:

- Pick out growing fields: electronics, hobbies, sports, home products, conveniences. (A lucrative example: the Toni home permanent, which Richard N. Harris sold to Gillette Safety Razor a few years ago for $20,000,000.) Stay far away from dying fields—an improvement in steam locomotives might have founded a fortune back in 1900, but it would be worthless today.
- Work on things you know. You don't have to be a certified expert (the best inventions are usually made by outsiders unaware of what "can't be done"). But if you're *too* green you'll spend years reinventing old stuff.
- Look for products that will be used once, then thrown away, like Reynolds-wrap, Kleenex, tin cans. This promises steady sales (and royalties). The guy who comes up with a good five-cent paintbrush will have it made.
- Appeal to laziness. Wherever you spot hand labor, an invention is needed. Home owners will pay extra to save effort—even small lawns are now cut by power mowers. Businessmen are even more willing to invest in labor-saving machinery because they get their money back (and then some) in reduced man-hours. Notice the power-operated tailgate elevators on trucks; they're expensive but they pay off. The success of the quick-copying machines (like Thermofax) rests on plain dollars-and-cents. It costs so much to have a typist copy a letter that the machines—at $100 up—more than pay for themselves.

### Small improvements in small products can pay off big

The pros in the inventing business concentrate on small improvements in standard products. That's where the money is. A radically new idea takes so long to win public acceptance that



*It costs so much to have a typist copy a letter that the quick-copying machines pay for themselves.*



Copyrighted material

the original inventor may get little out of it.

The zipper, for example. It was invented by E. P. Judson in 1891. Not until 1905 was the Hookless Fastener Co. formed to exploit his patent. And not until the 1930s did the zipper really push aside buttons and hooks. The important, profit-making patent was not Judson's, but later ones issued to Gideon Sundback, chief engineer of the Hookless Fastener Co., for improvements in the zipper and the machines that produce it.

### Keep it simple: The Case of the Square Clothespin

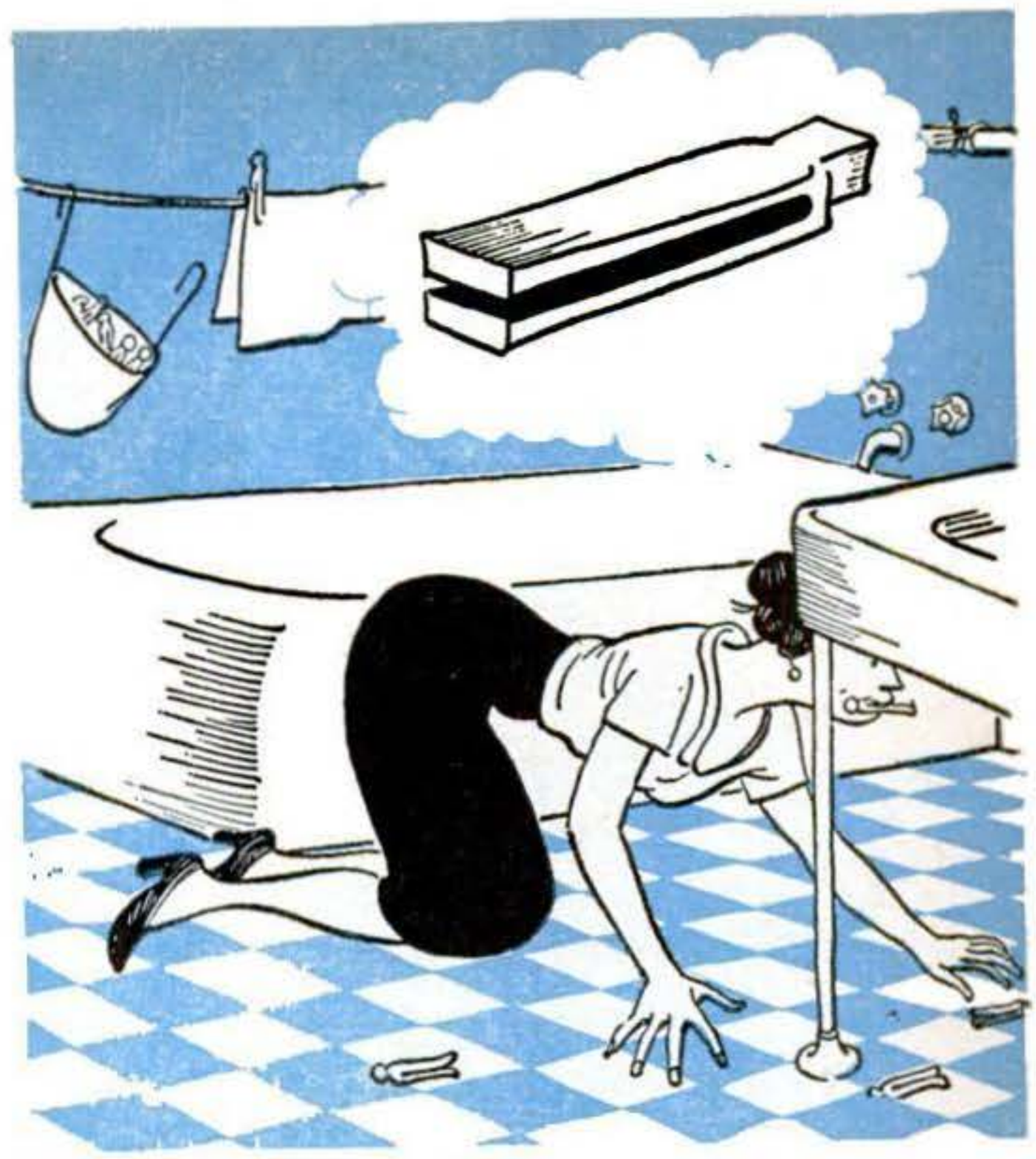
The simpler the improvement the bigger the rewards. A Texas housewife made a fortune because she became annoyed at the way ordinary clothespins rolled onto the floor—and thought up the squared-off clothespin. Another woman made squeamishness pay: Offended by the sight of the toilet-bowl brush, she invented a small disposable mop to eliminate it.

Things like these, in everyday use in ordinary homes, are best for independent inventors to aim for. You already know the requirements. You can build and test experimental models with little trouble. And you'll get more attentive consideration from manufacturers of consumer goods.

### A few rules to follow about what not to invent

It's easier to pinpoint what not to invent. Some fields are overcrowded. So many varieties of bottle caps and tube caps have been tried that the chances of hitting on a successful new idea are slim. More than 6,000 patents have been issued on self-locking nuts, and dozens of efficient types are already on the market (yet inventors keep right on devising new ones). You can get a patent in a crowded field, but it's not likely to be worth much. It will be so "narrow"—pertain to such fine details of design—that a smart engineer can work his own design around it.

Some fields are tough to crack, among the toughest being automobiles. One auto maker looks at about 8,000 ideas a year, but buys only eight. Even when a deal



*A Texas housewife became annoyed at the way ordinary clothespins rolled onto the floor—and invented the square clothespin.*

is made, the terms are rarely generous. You have only five possible customers for an automotive invention; if they don't buy, you have nowhere else to go. (There is a good market, however, for auto accessories that don't have to be installed at the factory; the many small and medium-sized manufacturers in this business are looking for new ideas.)

The prospects for an airplane invention are even more dismal. Most aircraft manufacturers pool all patents, so no single firm has much to gain from buying an idea on the outside. While the pool itself occasionally buys a patent from an independent, it is the one and only customer and can set the price.

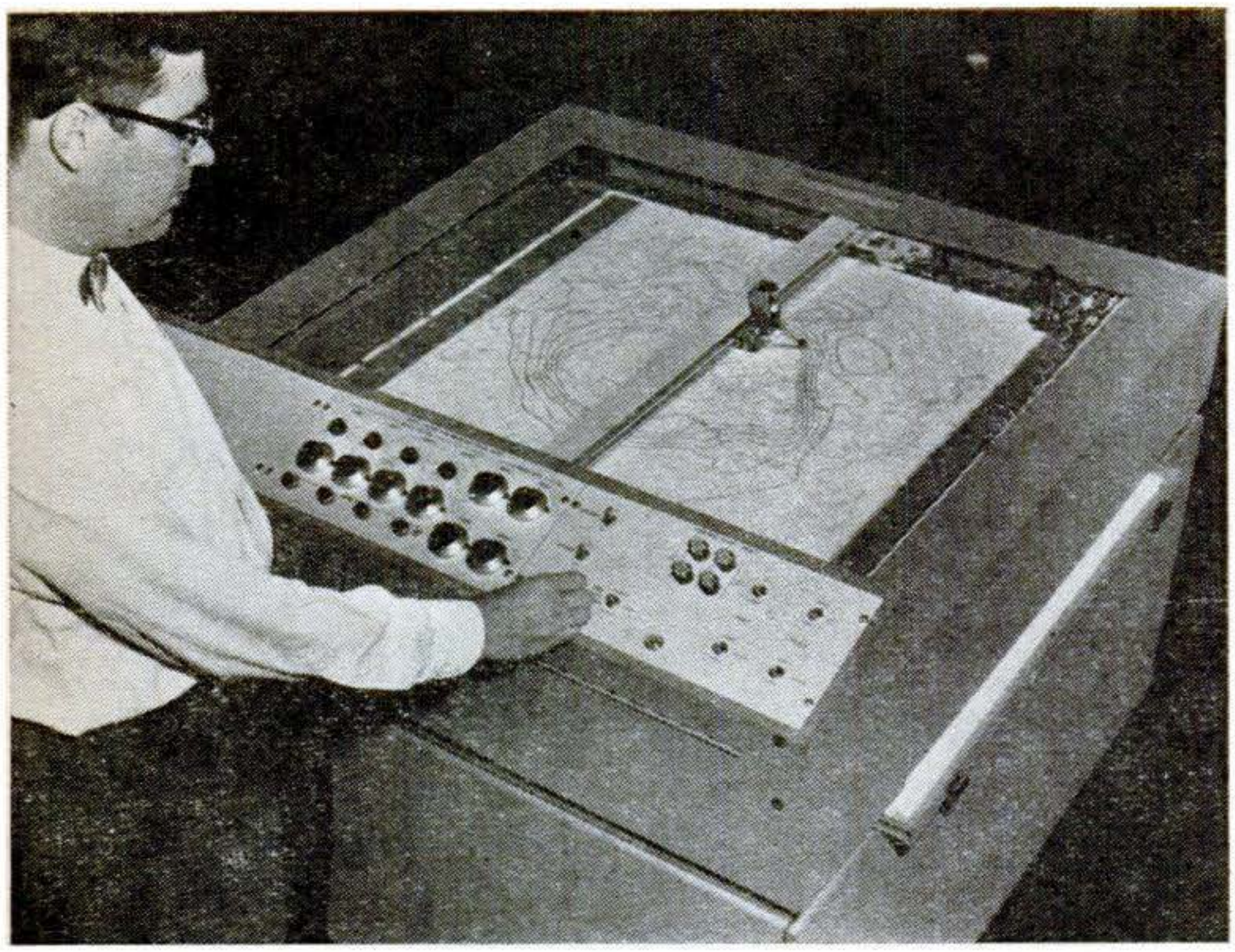
### And perhaps most important of all . . .

You should be ready to break any rule. Last summer one esteemed independent inventor, ticking off his own private list of dead fields not worth wasting time on, included flypaper. It certainly seems obsolete in the DDT age. Yet only recently scientists have discovered powerful chemical lures that will attract bugs for miles around—to meet extinction on flypaper.

Maybe there's hope even for steam-locomotive inventions.



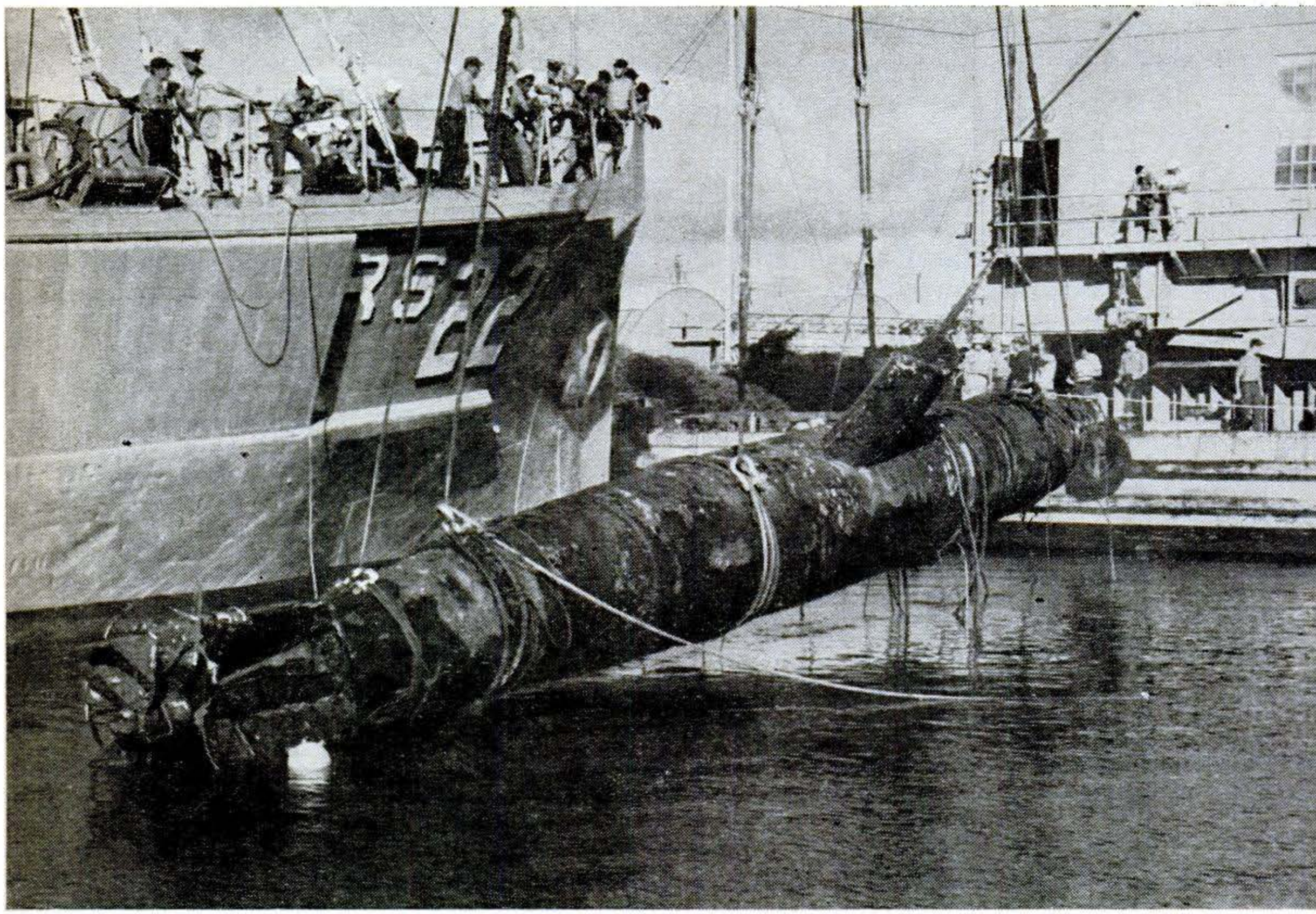
Copyrighted material



## Maps plotted by electronics

This electronic computer is fed weather information on tape, reads and interprets it—and in three minutes comes up with a 30-by-30-inch weather map of the Northern Hemisphere, isobars and all. Hand-plotting takes 20 minutes.

The computer-plotter was built for the Weather Bureau by Electronic Associates, Inc. It's making maps at the National Meteorological Center, Suitland, Md.



## Midget Jap sub recovered

This corroded two-man submarine was raised recently from waters off Pearl Harbor—19 years after the Japanese attack that got us into World War II. It was discovered accidentally on a bed of coral 70 feet below the surface during Navy diving practice. Damage indicated it succumbed to a U. S. depth charge before the two torpedoes it carried could be fired—they were found and dismantled by bomb experts. The crew apparently escaped through the open conning tower.



Copyrighted material

Helicopter lifts van off wheelbase . . .

. . . deposits it on freighter in river.

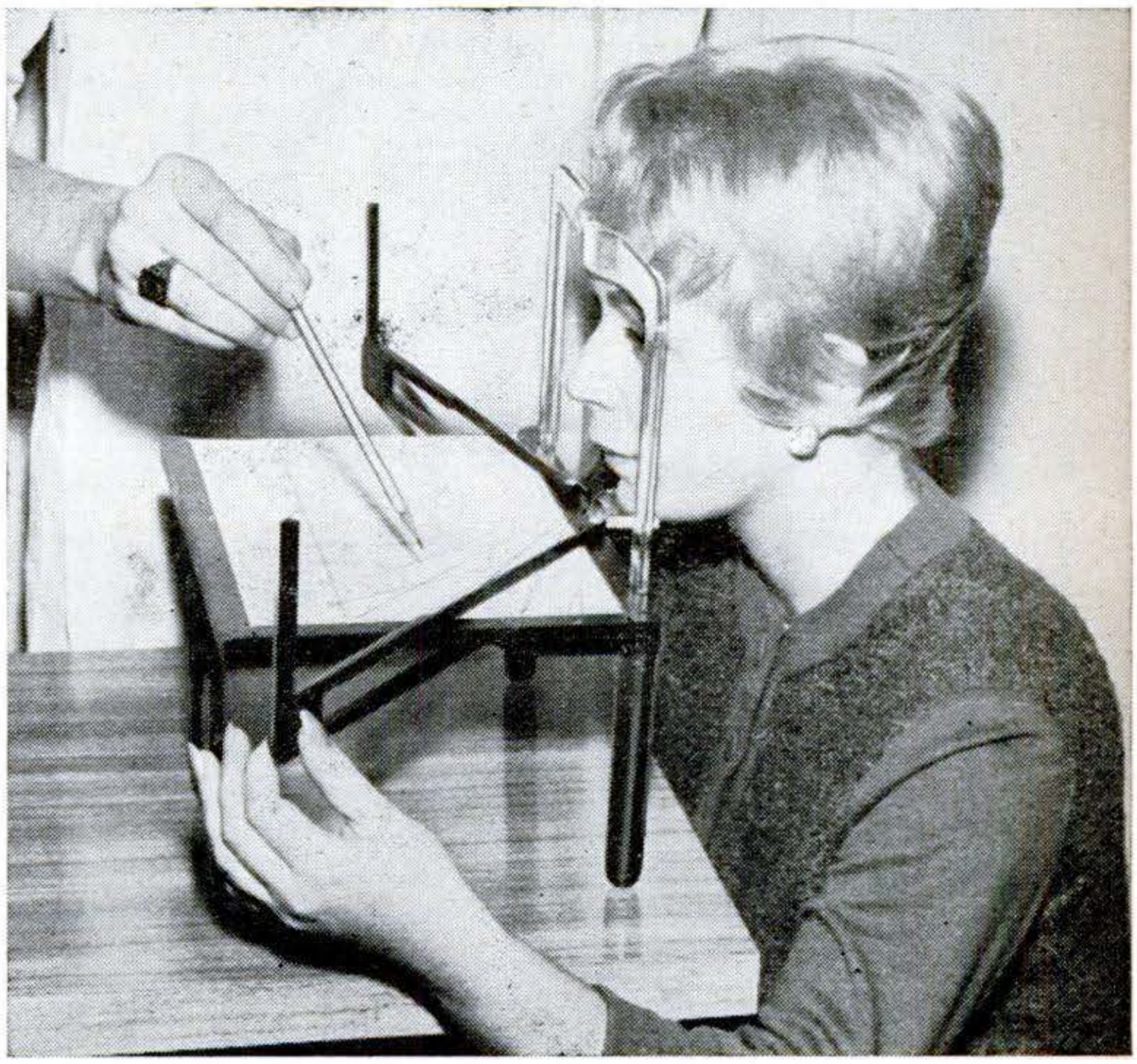
## Fly-off, fly-on freight by helicopter

The first aircraft to load cargo direct on an ocean freighter here lifts a truck-size container onto a ship in New York's Hudson River. The van rode piggyback on a flatcar into New York Central's Weehawken, N. J., yards, was hauled by truck trailer to the pier, unhitched, picked up by a Sikorsky S-60 Skycrane, and in minutes pinpointed on the deck of a U. S. Lines freighter. Participating in the demonstration were Strick Trailer Co. and a dozen freight carriers.

### Device tests side vision

With a subject gazing straight ahead and the sticks moved in until she can just see them, this Perimetric Screener measures her vision to either side.

It was developed by Dr. Theodore A. Brombach, Pacific University researcher, who used it to test peripheral vision of football-pass receivers, moving them to the other side of the line if their sight was better there. The National Eye Research Foundation will try it on motorists, pilots, and industrial workers. Side vision might be helped by contact lenses.

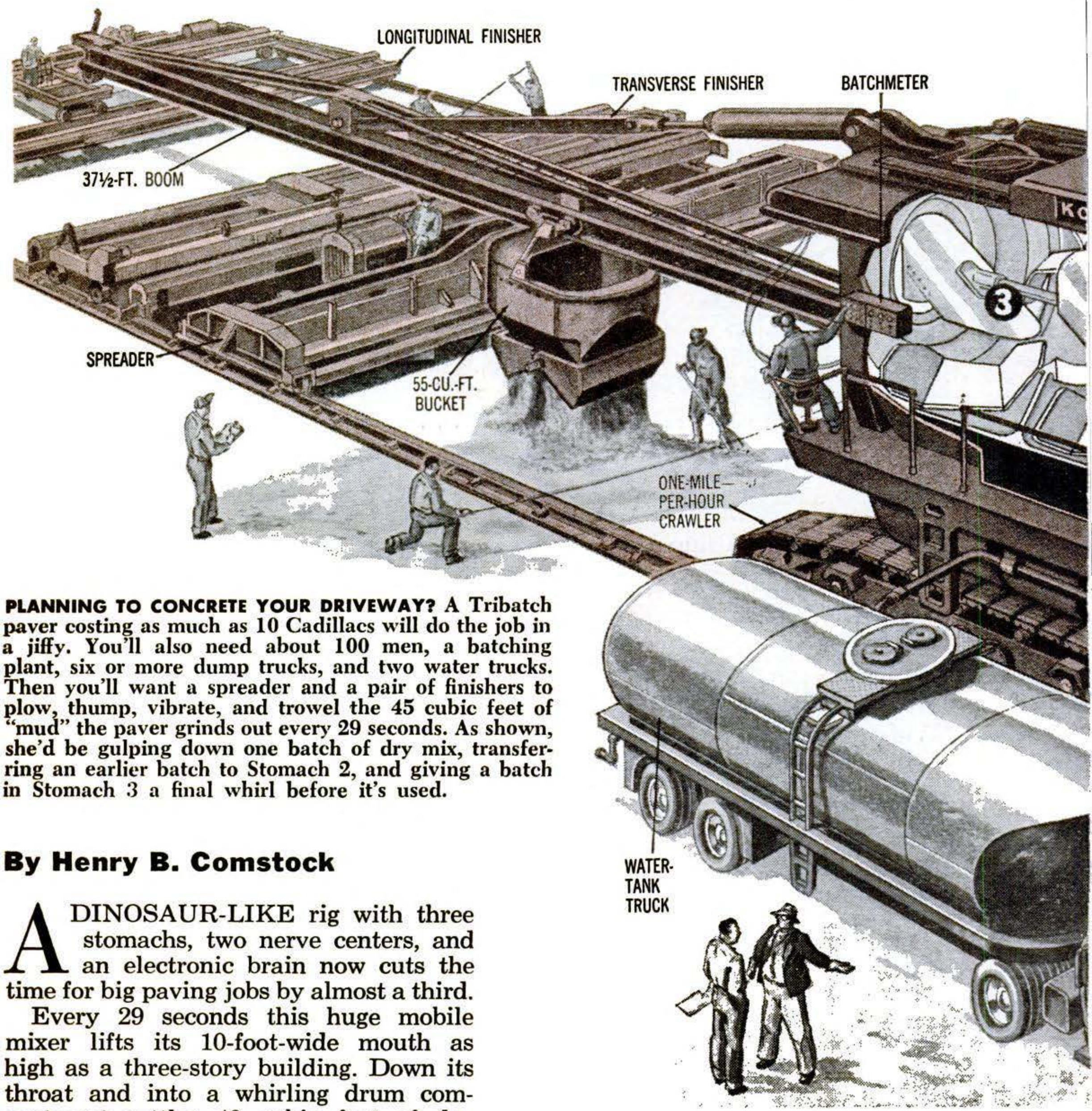




Copyrighted material

# Biggest Concrete Paver

***This monster with a 10-foot mouth swallows 80 cubic feet of mix a minute, digests it one-two-three, and spews it forth***




**PLANNING TO CONCRETE YOUR DRIVEWAY?** A Tribatch paver costing as much as 10 Cadillacs will do the job in a jiffy. You'll also need about 100 men, a batching plant, six or more dump trucks, and two water trucks. Then you'll want a spreader and a pair of finishers to plow, thump, vibrate, and trowel the 45 cubic feet of "mud" the paver grinds out every 29 seconds. As shown, she'd be gulping down one batch of dry mix, transferring an earlier batch to Stomach 2, and giving a batch in Stomach 3 a final whirl before it's used.

**By Henry B. Comstock**

A DINOSAUR-LIKE rig with three stomachs, two nerve centers, and an electronic brain now cuts the time for big paving jobs by almost a third.

Every 29 seconds this huge mobile mixer lifts its 10-foot-wide mouth as high as a three-story building. Down its throat and into a whirling drum compartment rattles 40 cubic feet of dry gravel, sand, and cement. Simultaneously, an earlier batch, blended with just the right amount of water, tumbles into a second compartment. In still a third, a fully churned mix is ready for transfer to a boom bucket that will dump it between the forms, or "headers," of the highway wending its way to the horizon.

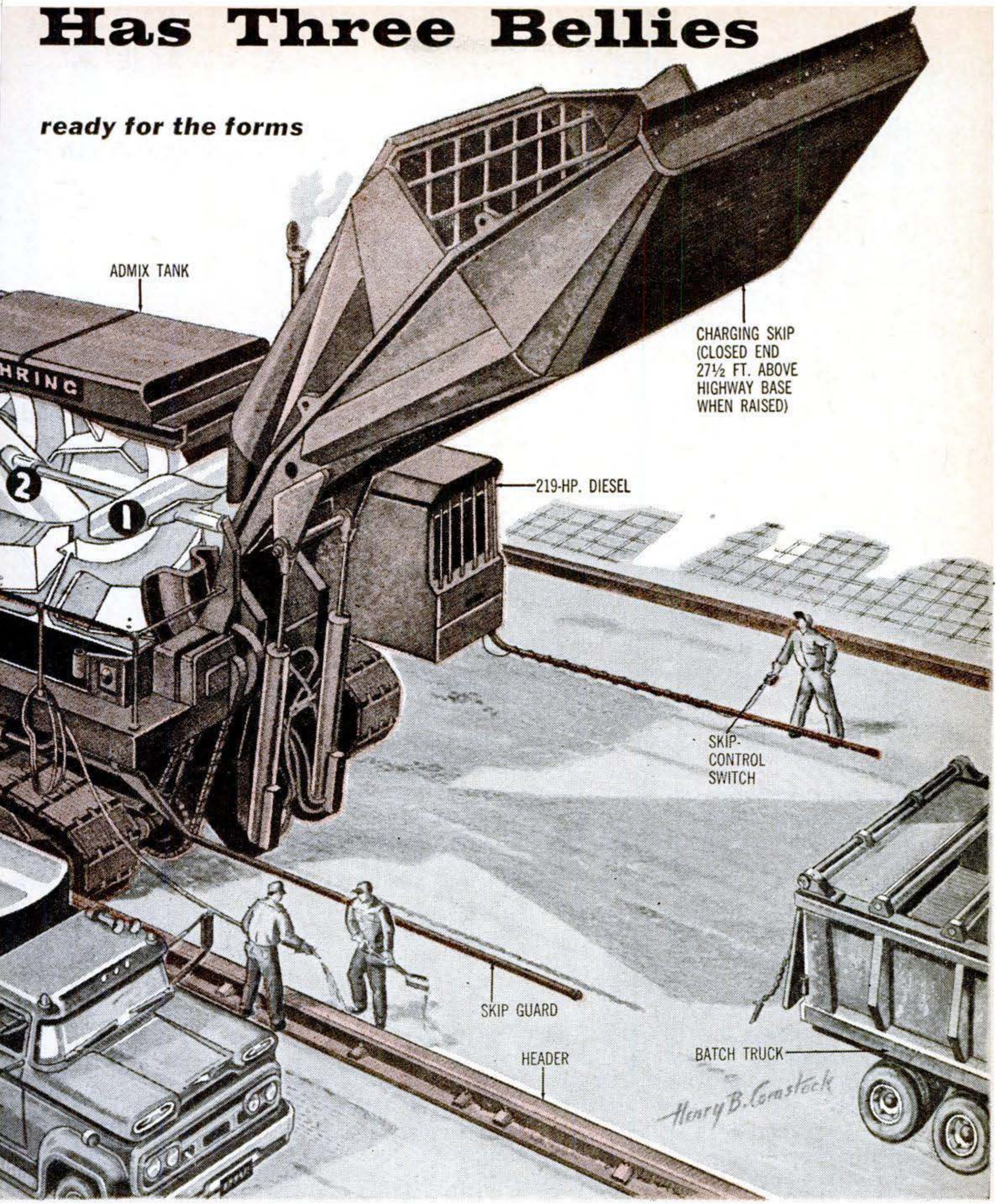
It's this one-two-three routine that sets the new Koehring Tribatch mixer apart from all former machines. Shoving the batter along at the rate of 124 charges an hour, it whips up the makings of half



Copyrighted material

# Has Three Bellies

***ready for the forms***




a mile of two-lane highway every work day.

***An old trick made better.*** Upping performance by sending concrete through a mixer in lapping cycles isn't new. More than 30 years ago the Koehring Co., along with other outfits, developed a dual-drum paver. That was a neat way around a problem common to manufacturers in many industries: You can't always make a good rig better simply by building it bigger.

CONTINUED



Copyrighted material

## Within a single working day, the Tribatch can whip up

**PIPE EXTENSIONS** on either side of the skip keep workmen from walking under this 2½-ton loading chute when it's raised. The one at right also holds the skip-control switch. A 37½-foot-long bucket boom at the rear lets the Tribatch work inside or outside the headers.

In paving, the pattern has always worked like this: When the final grading is finished, you place a batching plant midway along the road base. Or, if you're slabbing more than seven miles, it pays to set up batching plants at two locations. There, you blend gravel, sand, and cement. A steady procession of trucks picks up the dry stuff, scoots to the work site, and pours it into the paver's skip. So far, so good.

But very early in the game, contractors began to chain-gang these rigs, using two or three pavers as a team. This doubled or tripled production, as long as the outfits took the same charge. Now suppose you bought a new paver, half again as big as another. You were in trouble. Either you had to run two fleets of trucks, or lose time metering different amounts of dry mix into each skip.

The dual-drum paver was the answer. Working with single-drum outfits, it gulped down identical charges and gave them the same tumbling time. Only the cycling was speeded up. Operating the same way, the Tribatch is a logical successor to the dual-drum job.

***Mudslingers never had it so good.*** The man at the controls of a paver has never had time to take up tatting. On the simplest machine he must raise and lower the skip. Then he must dump just the right amount of water into the mixing drum, haul in his bucket to receive each charge, and send it skimming along a boom angled this way or that to spot the concrete where it's wanted. At frequent intervals, too, he must inch the paver forward.

When dual-drums came along, operators had another chore. Between the two compartments was a transfer chute, pivoted on a shaft that ran through the center of the barrel. This had to be given two half-flips each time a charge went through. In a Tribatch there are two of these scoops (in addition to the usual bucket loader). No one operator could handle the resulting rapid-fire routine.

He doesn't have to. As a matter of fact his job has become so easy that one mudslinger has worked up an act for visiting firemen. As soon as he places a batch he swings down from the control platform and takes a simulated nap on the shoulder of the grade. Meanwhile the drum rumbles nonchalantly.

***Electronic brain flexes muscles.*** A box about four times the size of a dinner pail controls all cycling operations in the Tribatch drum. Once scheduled, it determines just when—and how much—water will enter the first compartment. Occasionally, contracting requirements call for additional digestive juices in the form of chemicals, to give the concrete special characteristics. An admix tank above the drum can be filled with the fluid and set to dribble any amount up to 40 ounces into each charge.

In addition, the "batchmeter"—that's what Koehring calls the electronic brain—flips each transfer scoop after a predetermined number of seconds. Some leeway is needed here. For example: A



Copyrighted material

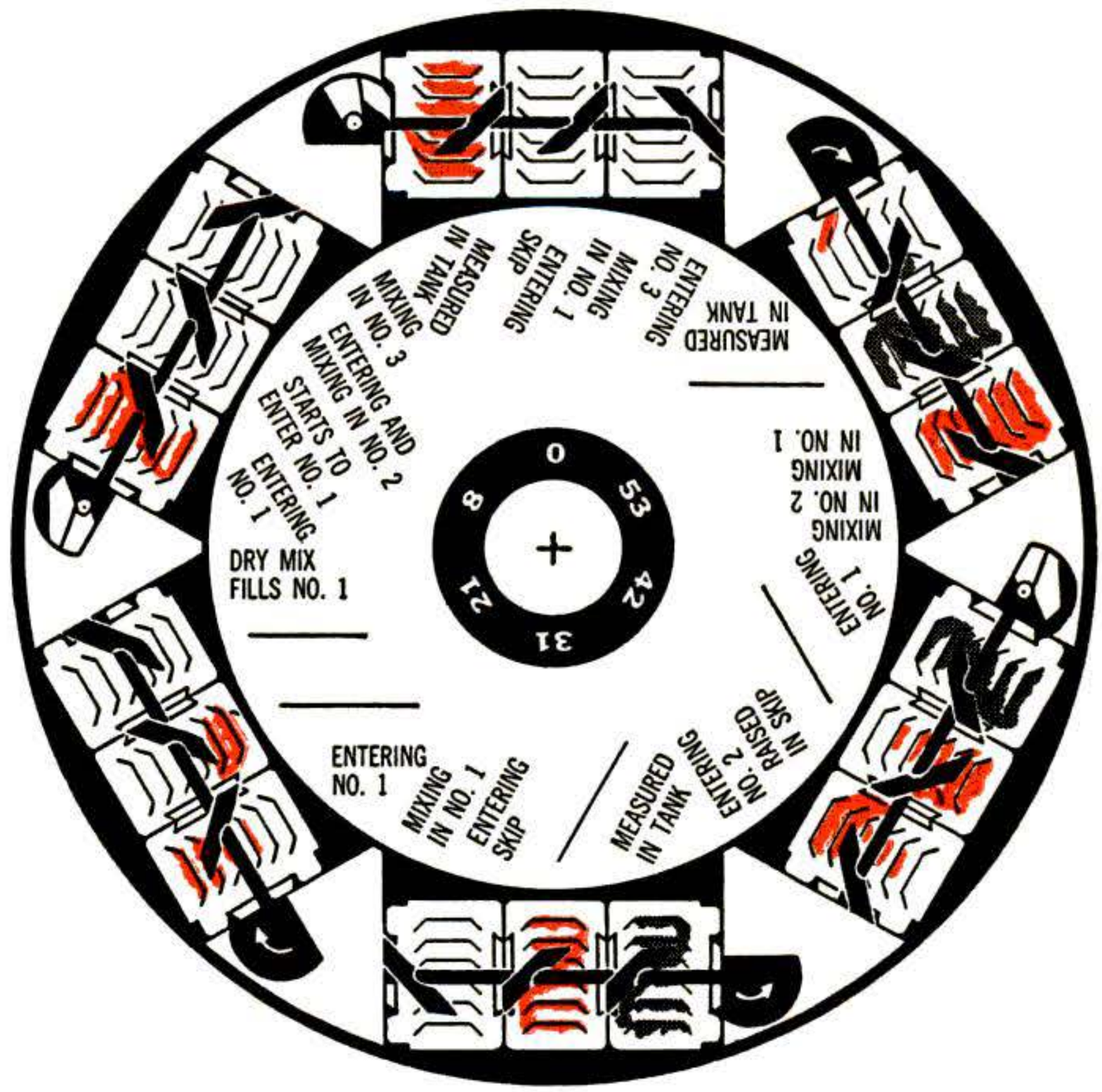
heavy non-slumping mix used on a steep highway grade or heavily banked curve can't be put through as fast as ordinary batches. Finally, both the skip and the bucket-loading chute work automatically—but only with these two safeguards:

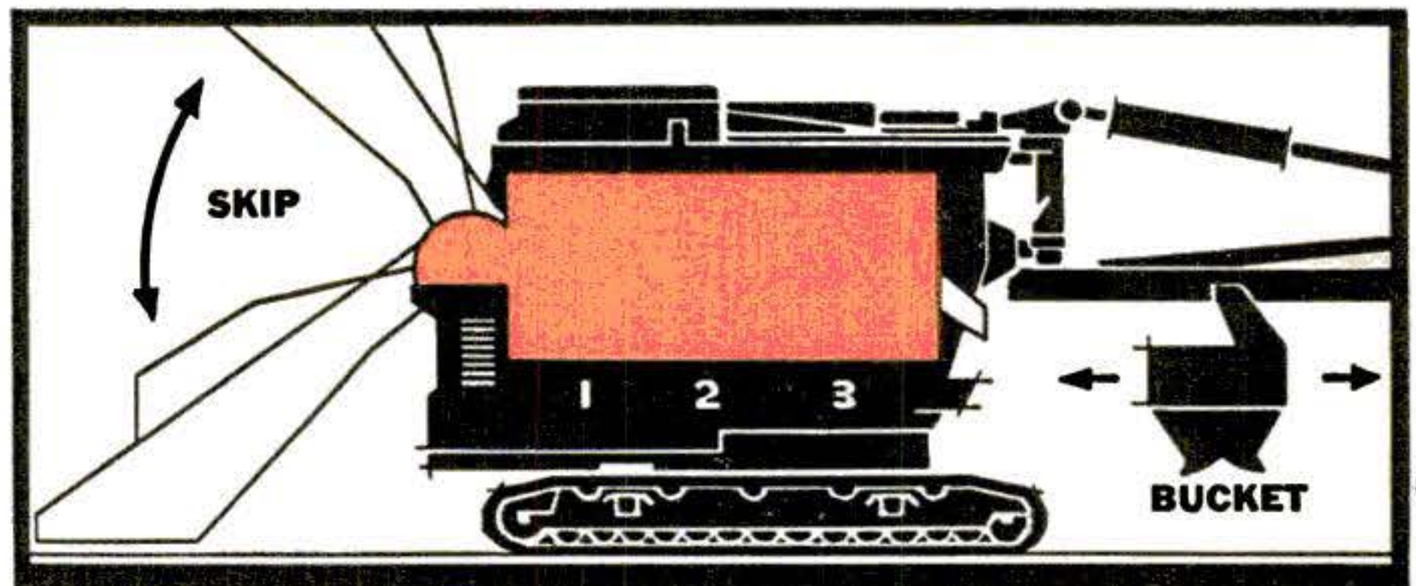
The dump man who waves trucks into position for charging now punches a button to set the skip in action; until he does it can't budge. At the other end, the scoop can't flip until the bucket is spotted below it.

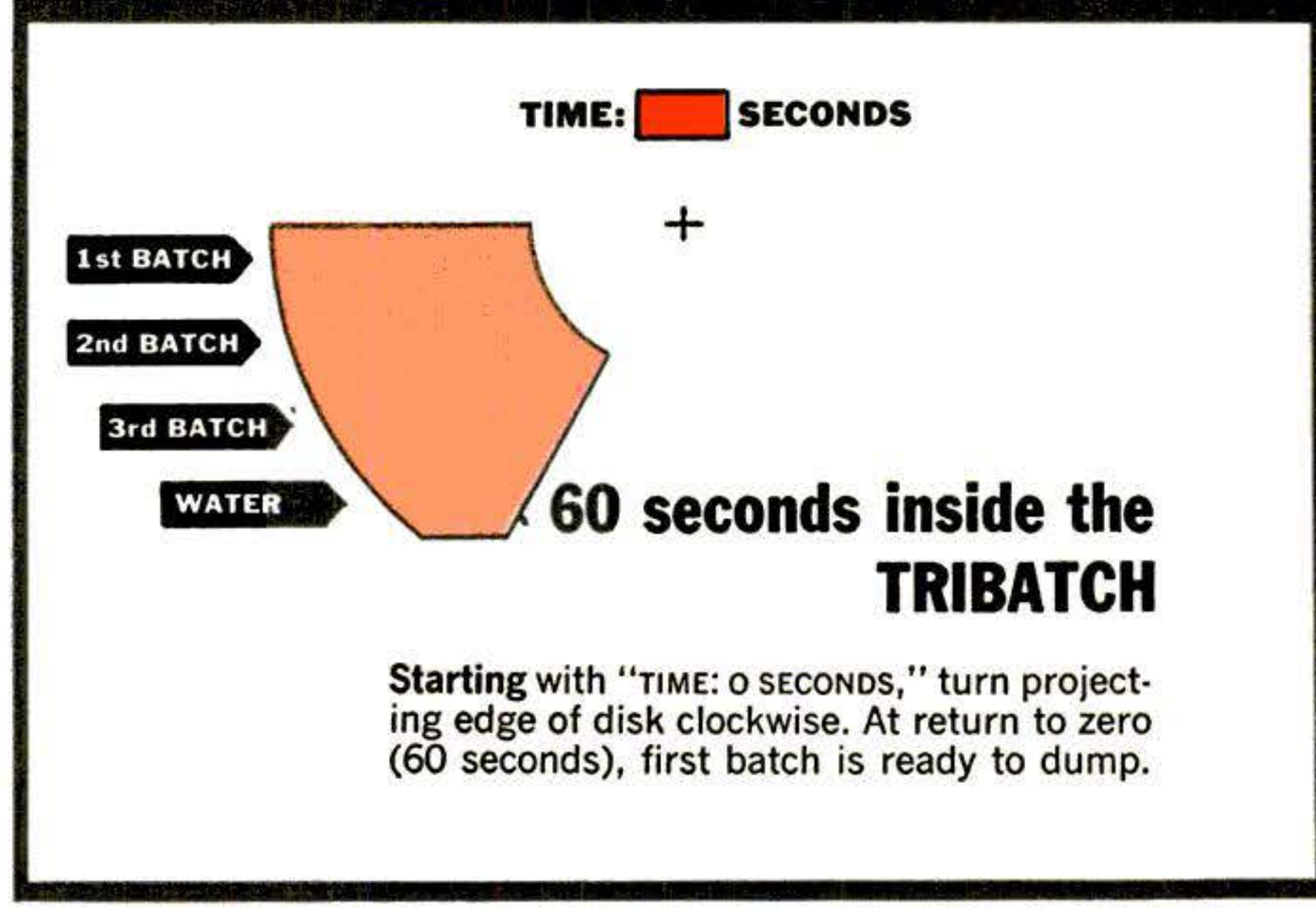
It all adds up to an efficient machine. So efficient that one contractor who teams his Tribatch with a two-drum outfit says it costs him $15,000 every time he starts them. He's talking in terms of the overall picture—a 175-man payroll, a batching plant, a battery of spreaders and finishers, 12 dump trucks, and four tank trucks. One of the tankers is hose-connected to each paver; when these two are empty they run for water and the other pair takes over.

At day's end, too, there's a Herculean cleanup job. It takes two hours to flush down a Tribatch. Then about once a month, a hammer man goes into each drum compartment through a special crawl hole, and does a chipping job on the blades and scoops.

Nobody is even willing to think about what would happen if some nightmare mischance should let tons of concrete set rock-hard inside the giant machine. It *can't* happen, they tell you, and roll up their eyes at the very thought.




**FOR AN X-RAY VIEW** of the Tribatch in action, mount the disk and rectangle on cardboard and trim around the edges. Cut out colored areas on rectangle, and pivot the disk behind it with a paper fastener pushed through holes at crosses.

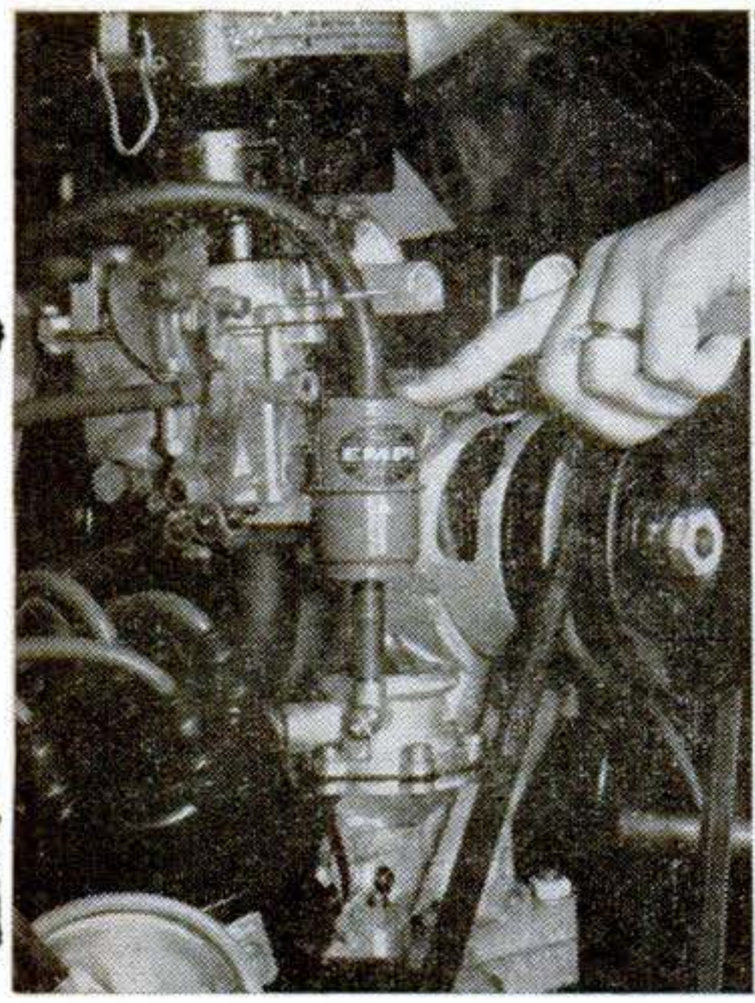


Copyrighted material

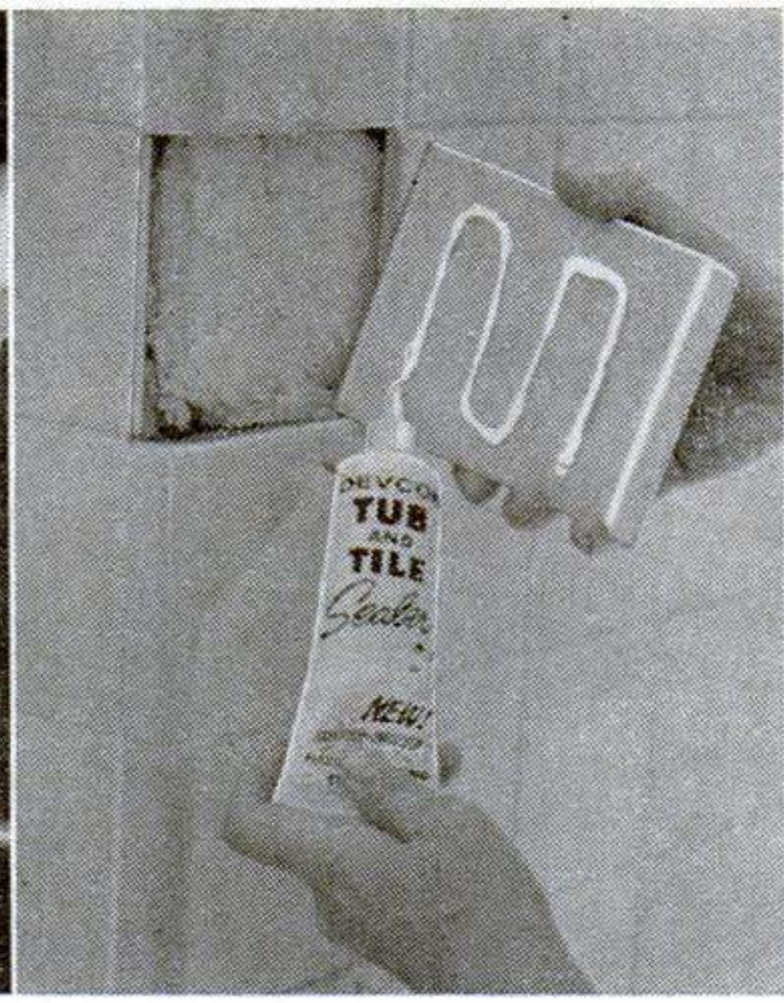
## Remote-Control Movie

Insert film in this projector, sit back, and take it easy. The Dual/Lectric does all the work: threads the film automatically, turns off the room lamp, and turns on the projector.

In addition, a no-knob remote-control cube when turned in your hand starts, reverses, or stops the show for viewing a still. It's done by mercury switch, with a pilot light to show position. $239.95 up. Bell & Howell, 7100 McCormick Rd., Chicago.



**IN-LINE FILTER** removes water and dirt from fuel lines to '61 Volkswagen engines. Gasoline passes through a sintered-bronze screen. You clean the unit by reversing and flushing it with gas. Price, $3.95. European Motor Products, Box 668, Riverside, Calif.

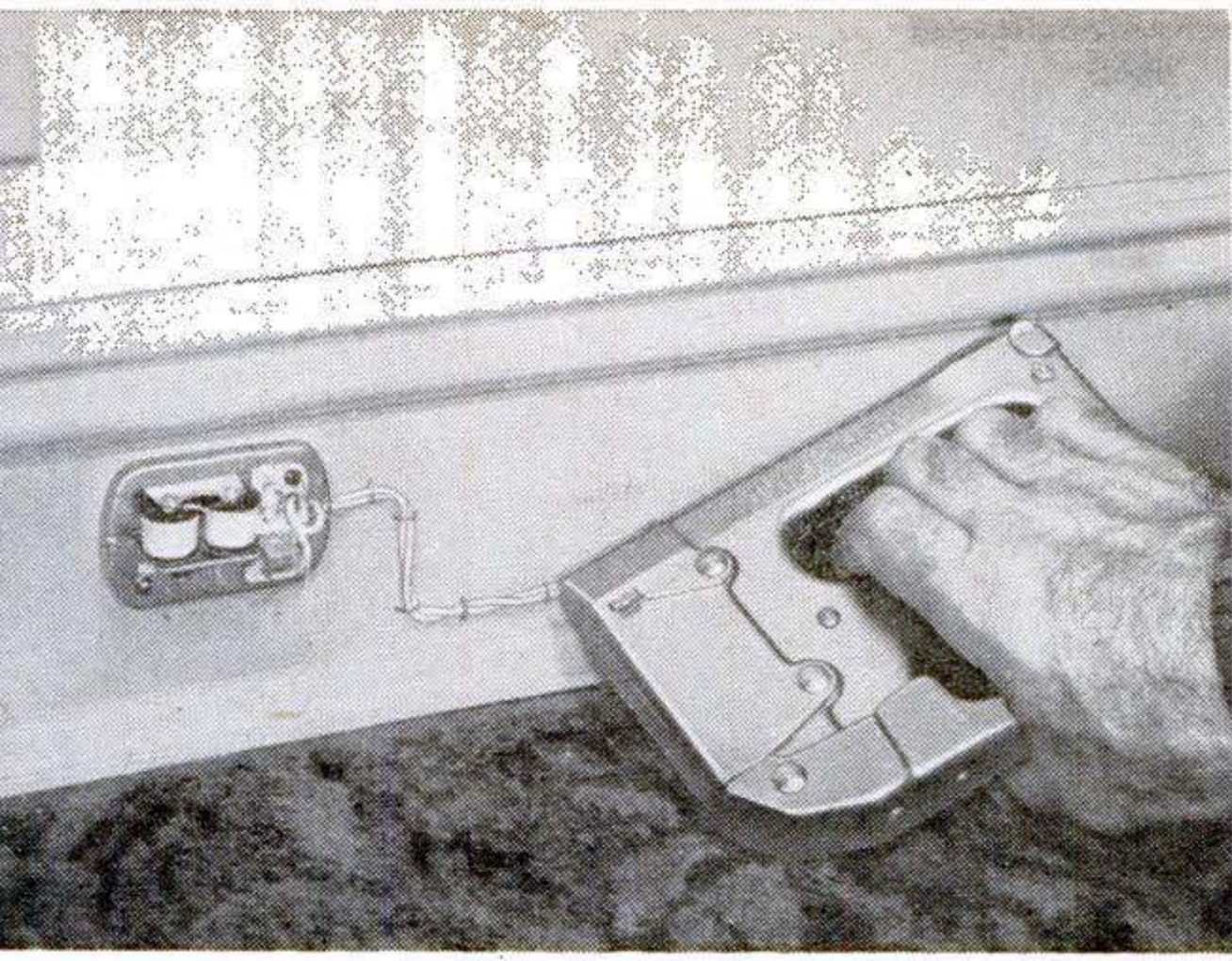



**TILE PATCHER** is a white mastic that will anchor loose tiles, seal a gap between tub and wall, and do other calking jobs. The waterproof adhesive is noncracking, and can be smoothed with a wet finger. Tube costs 98 cents. Devcon Corp., Danvers, Mass.

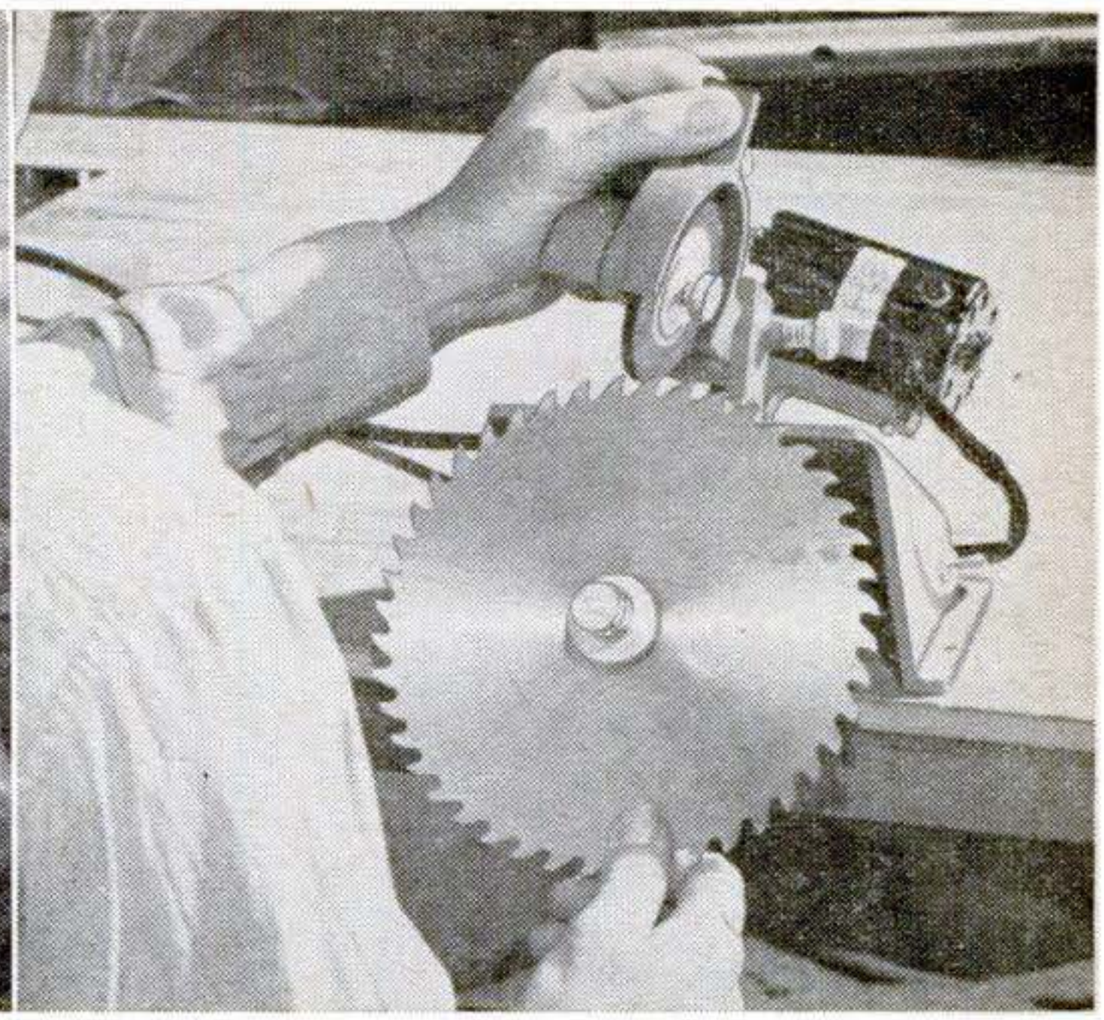
**AIR CLEANER** is an electronic filter so compact it fits between blower and return duct of forced-air furnaces. Living-area control panel even tells you when to wash filter. $325, plus $75 for air-conditioning unit. Minneapolis-Honeywell, Minneapolis.



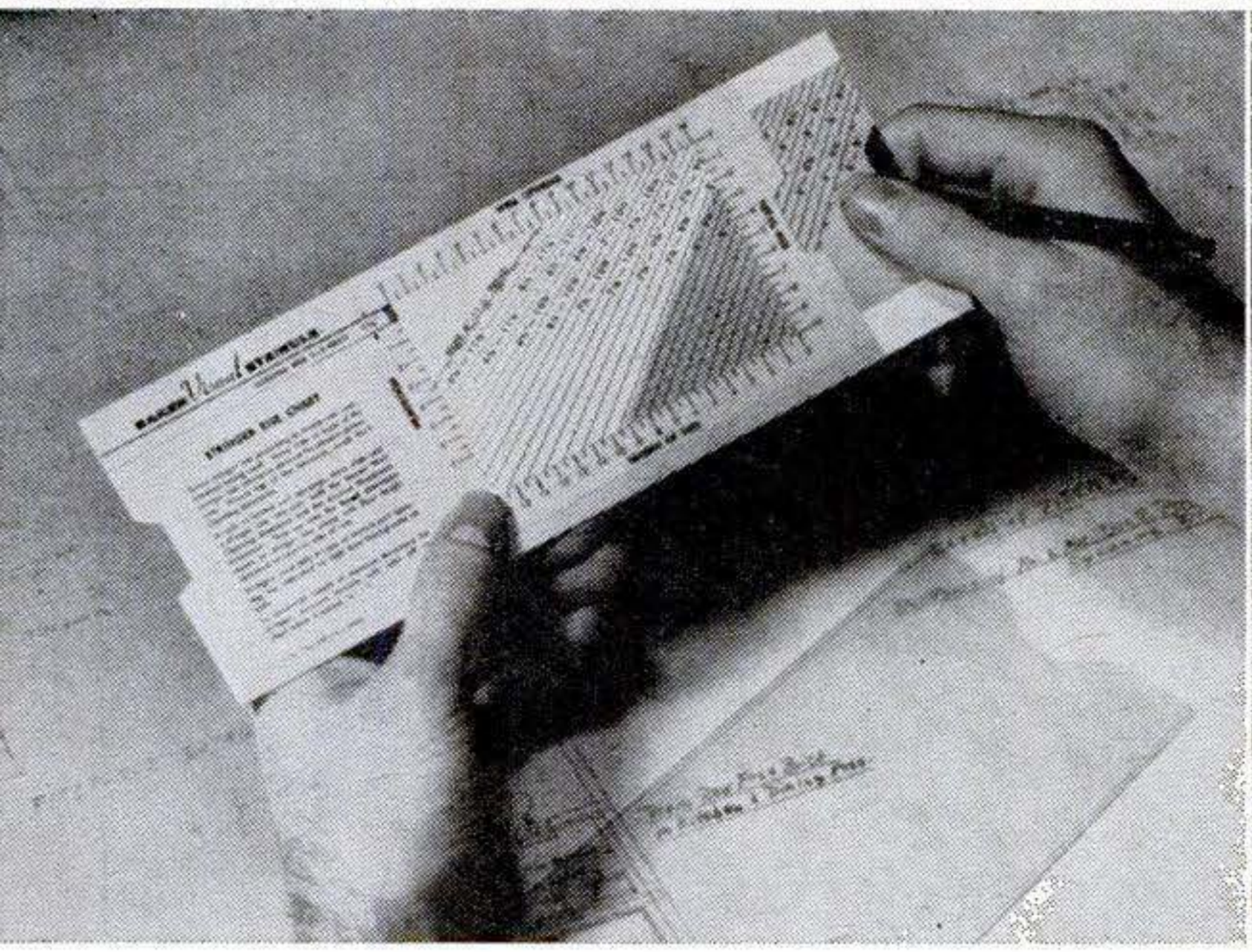
Copyrighted material



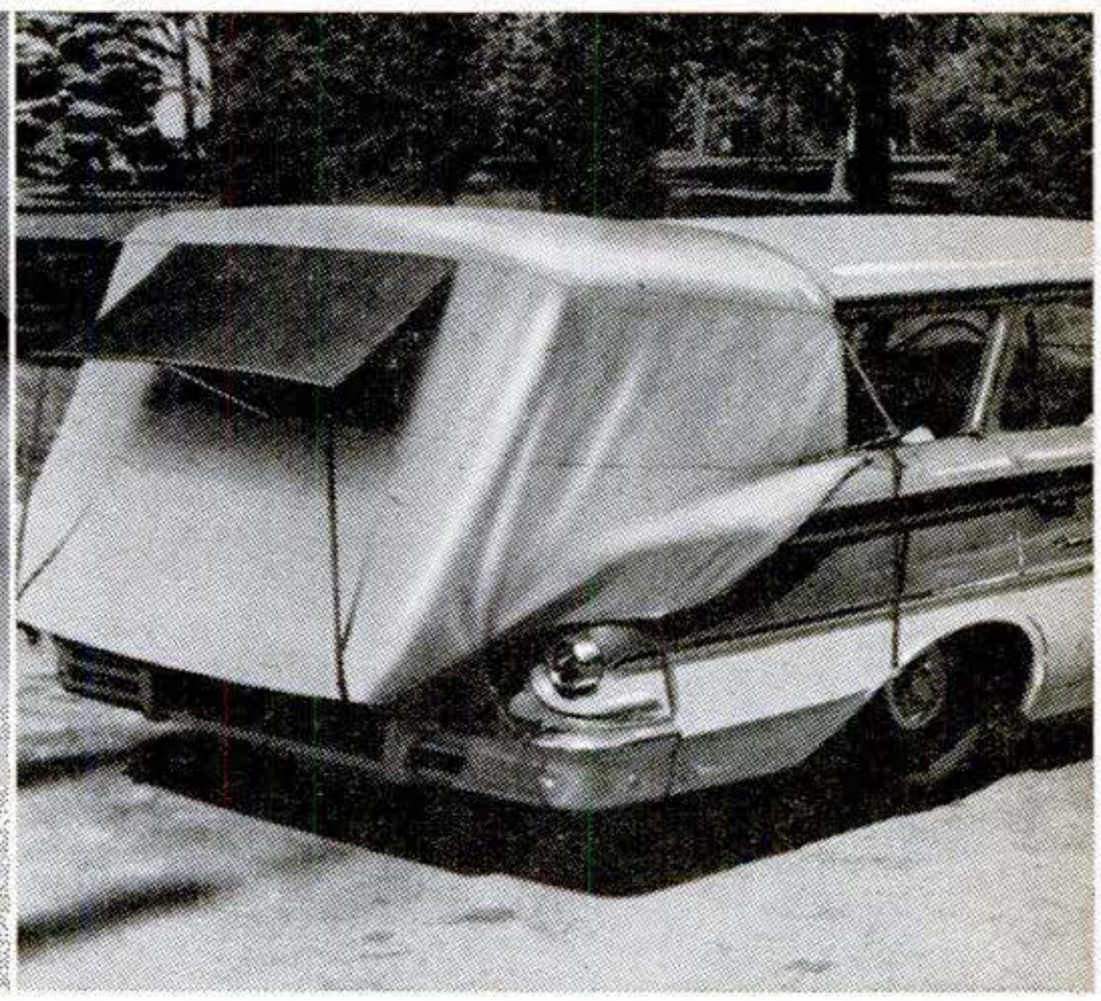
**BELL-WIRE STAPLER** drives staples just deep enough so you don't compress the wires, squeeze or break the insulation. Gun can be used for low-voltage wire up to 1/4-inch diameter. Staples come in four sizes: 9/32, 3/8, 7/16, and 9/16 inch. Gun sells for $15, staples for $1 a thousand. Arrow Fastener Co., 1 Junius St., Brooklyn, N. Y.



**SAW SHARPENER** is driven by electric motor, has cam action that holds each tooth in place for edging and setting. You can use it for a 4- to 24-inch-diameter blade. Attachments sharpen chisels, router bits, scissors, knives; chain-, hand-, and band-saws. $95.50 without attachments. Easysharp Corp., 919 Fulton N.E., Grand Rapids, Mich.



**STAIRWAY COMPUTER** gives you unknown dimensions when laying out a stairway for any opening. By setting the known total rise, you can read directly proper number and height of risers and other combinations. Another setting gives number and width of tread needed. Transparent window provides visual reproduction of stair problems. $3.95. Emmert Products, Box 221, Sycamore, Ill.

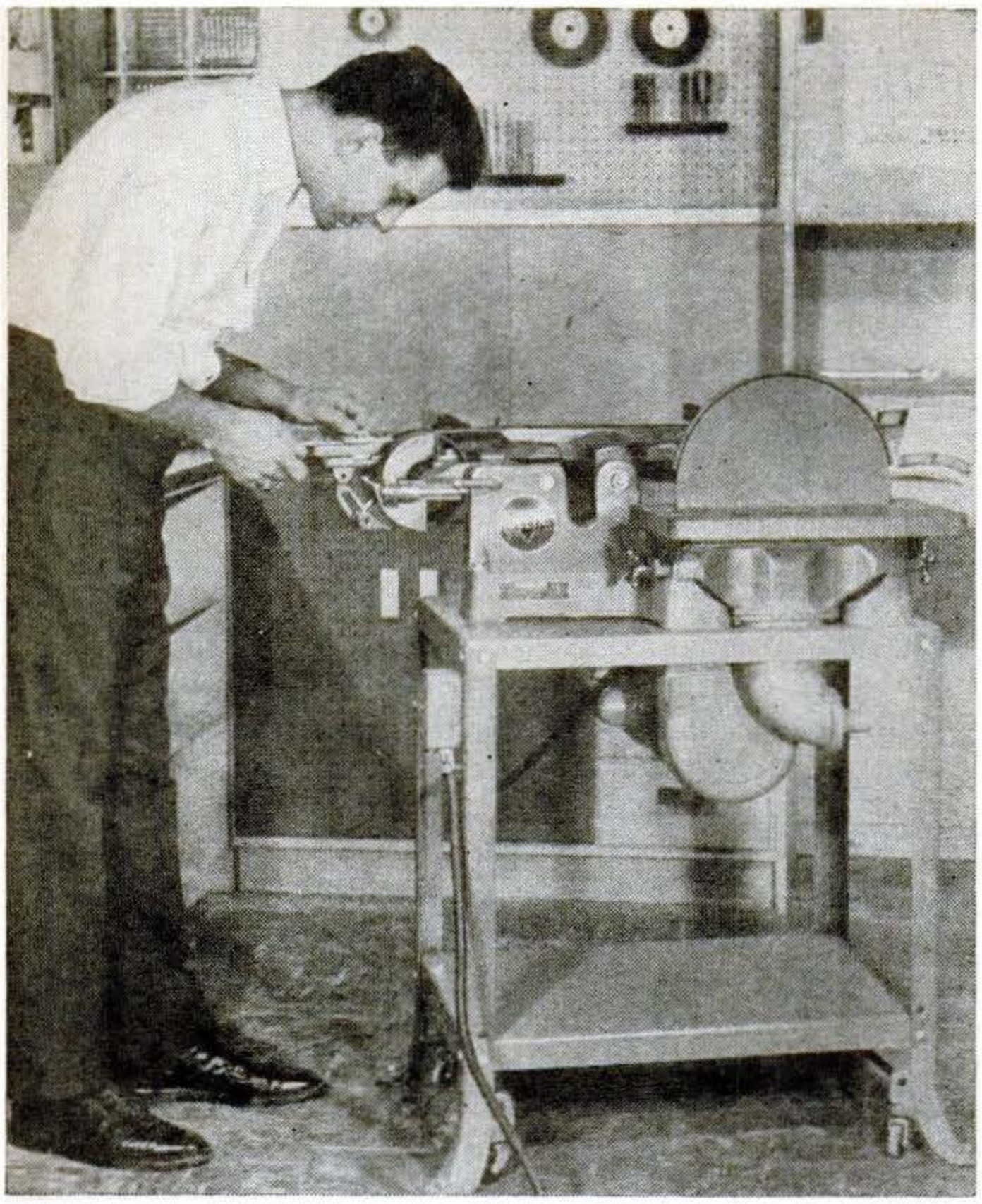


**STATION-WAGON PORCH** converts the interior of most models (except Rambler) into sleeping quarters for two or three people. The extension is made of water-resistant canvas with an opening of nylon mosquito netting. You can install it in two minutes, open or close curtain from inside. It stores easily. Price: $23. Morsan Tents, 10-27 50th Ave., Long Island City, N. Y.

CONTINUED



Copyrighted material

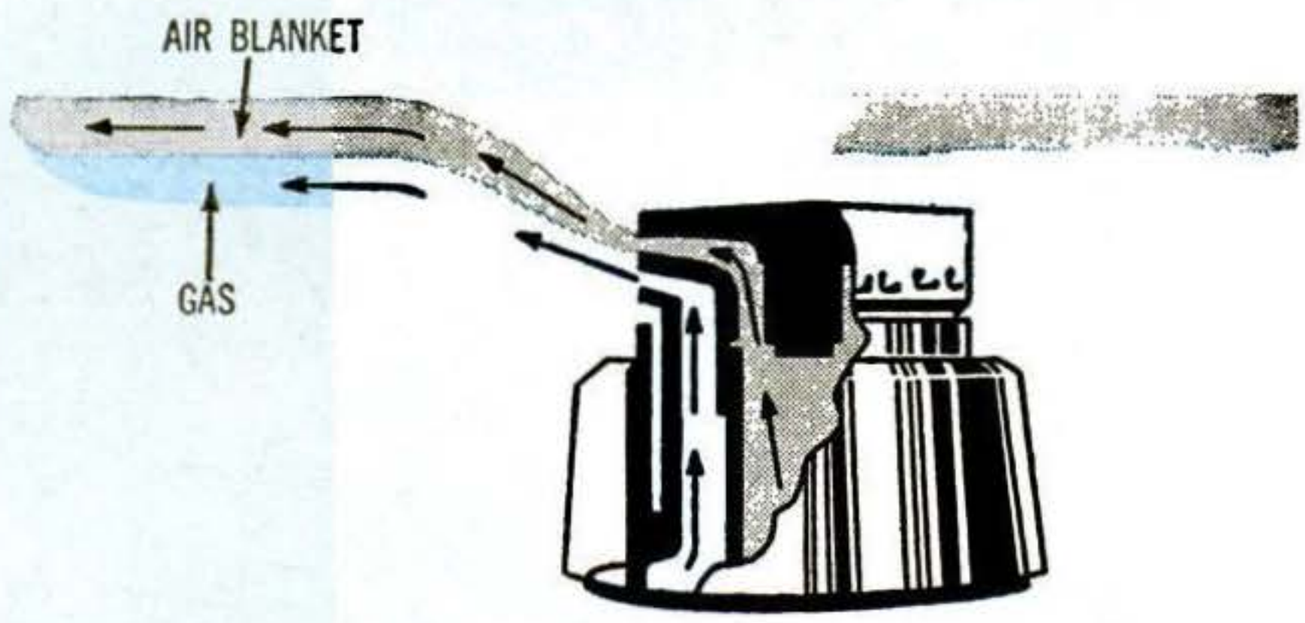


## Sander Can Grind Tools

This heavy-duty belt and disk sander can be had with a special attachment for sharpening knives, chisels, plane blades, lathe cutting tools, and screwdrivers.

The basic tool comes with a 4-inch belt and 12-inch disk, has special castings that can be connected with a dust collector. The tool-grinding attachment uses a 2-inch aluminum-oxide belt 52½ inches long that dissipates heat, avoids burning because of its long run.

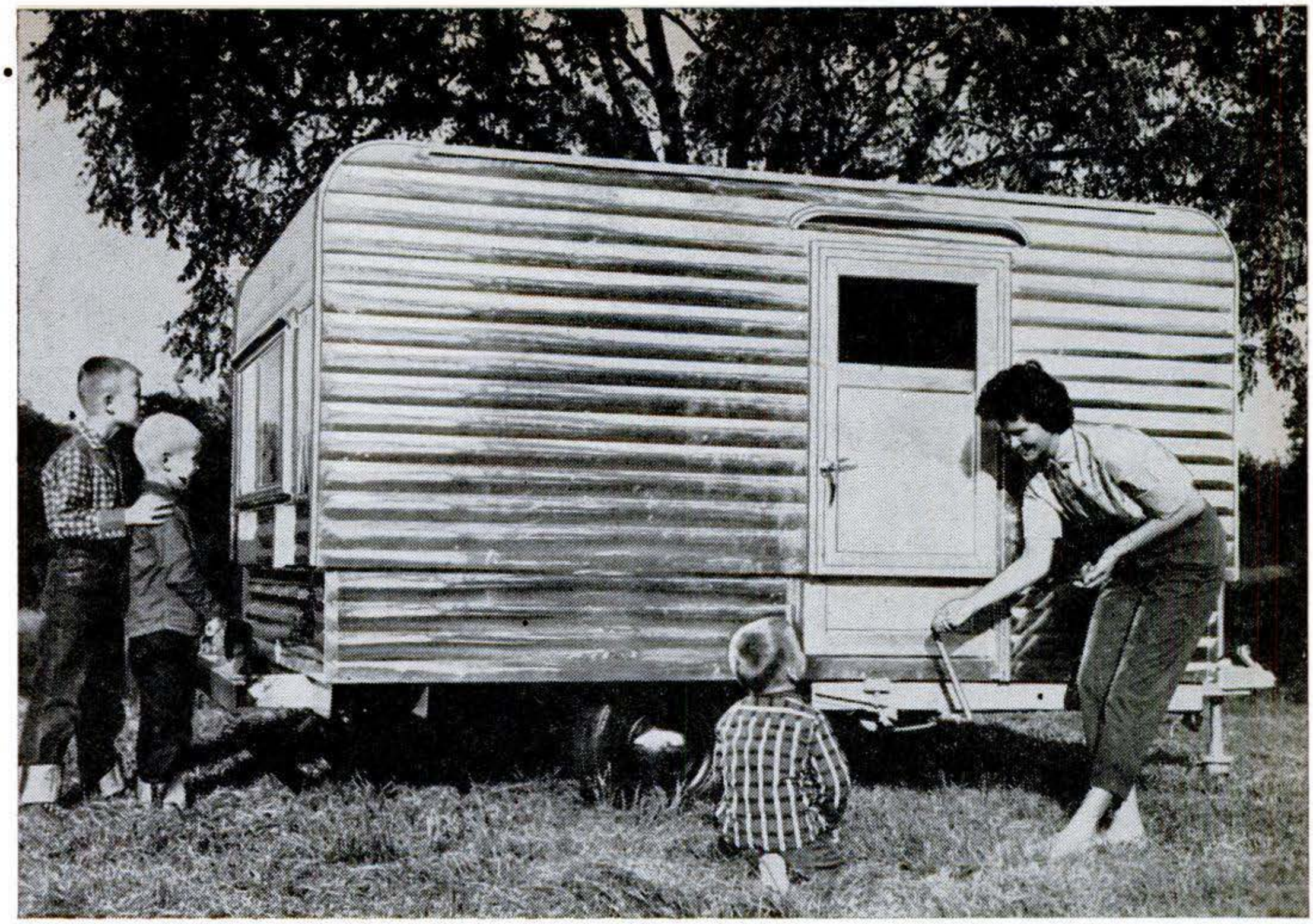
Sander, $134.50, without enclosed motor, stand, or accessories; tool grinder, $15.90. Delta Div., Rockwell Mfg. Co., 400 N. Lexington Ave., Pittsburgh.




**AIR BLANKET** in a new range keeps flame away from utensil, lets a cook melt chocolate in wrapper, cook sauces in glass. Extra air, provided by a built-in fan, comes from inside the burner. Blanket-O-Flame range, $179.95. Whirlpool Corp., St. Joseph, Mich.



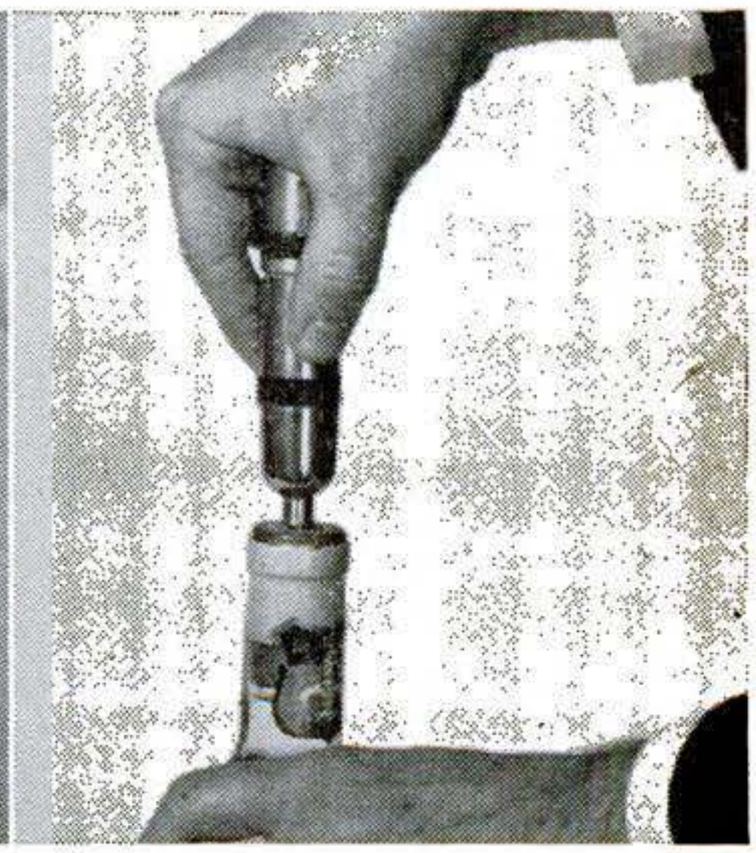
Copyrighted material



**COMPACT TRAILER** rides highway with a manageable 62-inch height, but at night you can crank up the top section for head room for a six-footer. Nimrod Five Star can sleep up to five adults, has a floor heater for chilly nights, includes a kitchenette with refrigerator, sink, and water tank. It's made of aluminum and steel, sells for $1,395. Ward Mfg., Inc., 2530 Spring Grove Ave, Cincinnati.

**FOAM HEADREST** shaped to fit the nape of your neck attaches to the back of car seat. You can adjust height and angle for upright driving or for off-road napping. It's priced at $8.95; $16.95 a pair. Mark Mfg. Co., 4230 Commercial S.E., Salem, Ore.

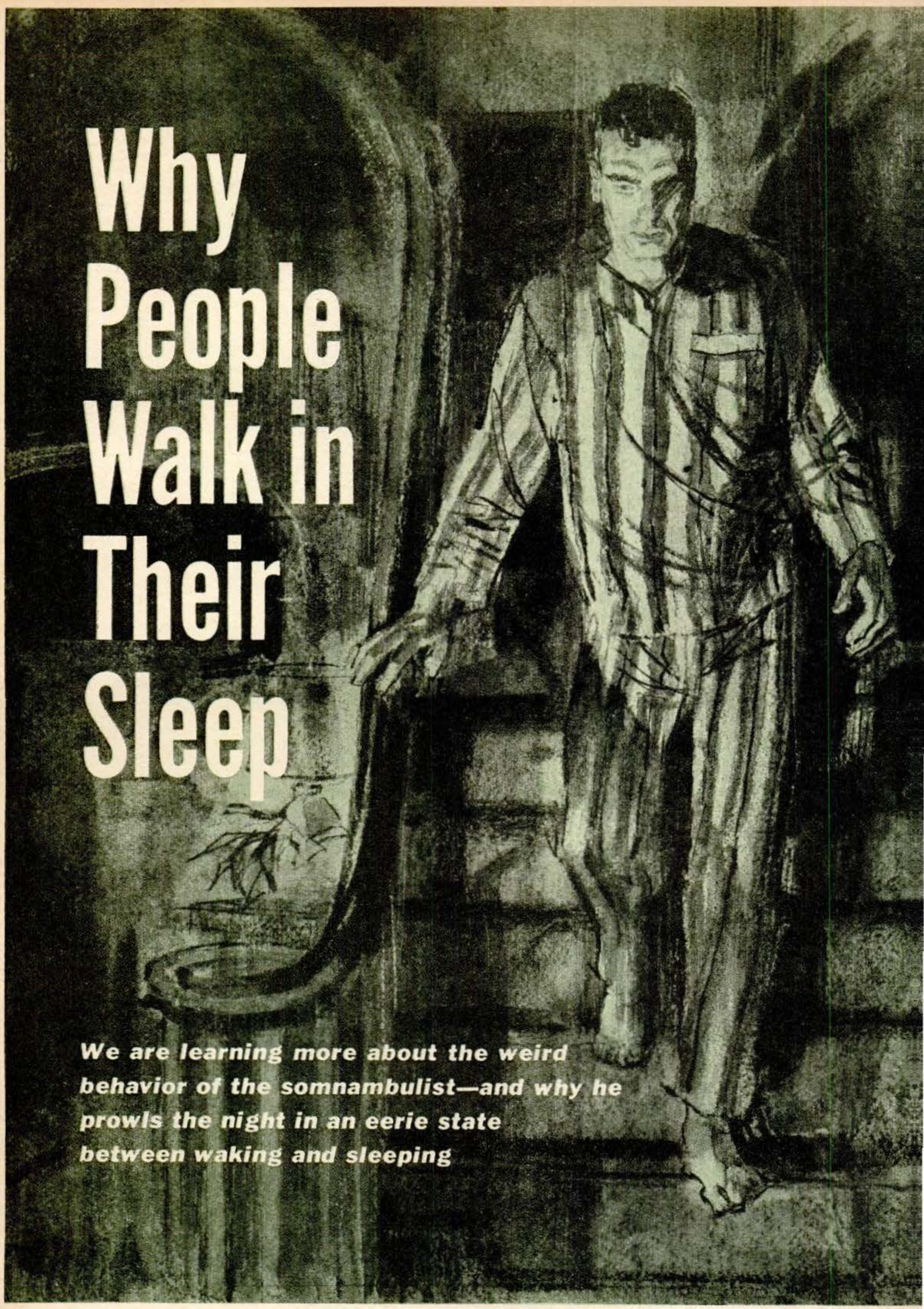
**SPRAY-ON GLUE** can be used on paper, plastic film, fabrics, upholstery, and other materials. The transparent, odorless adhesive dries rapidly, but leaves time for you to reposition items. $1.95 for 12-ounce can. Avery Label Co., 117 Liberty St., NYC.



**BOTTLE OPENER** removes cork by pressure of carbon-dioxide gas released through a puncturing needle. You can open 30 bottles with one cartridge. Cork-Ace sells for $10; a box of 10 cartridges costs $1.19. Bloomingdale's, Lexington and 59th St., NYC.



Copyrighted material

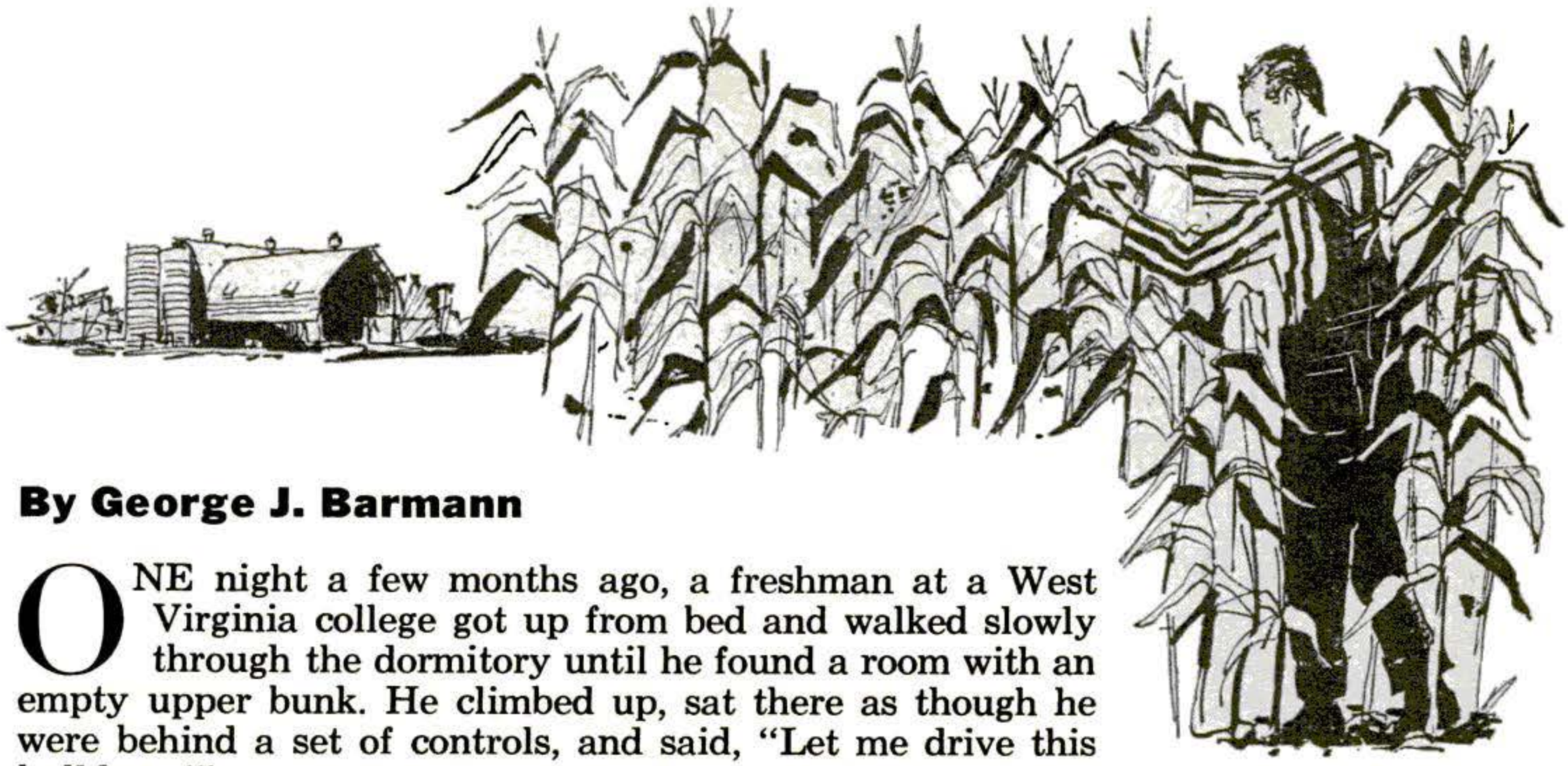


# Why People Walk in Their Sleep

***We are learning more about the weird behavior of the somnambulist—and why he prowls the night in an eerie state between waking and sleeping***



Copyrighted material



**By George J. Barmann**

ONE night a few months ago, a freshman at a West Virginia college got up from bed and walked slowly through the dormitory until he found a room with an empty upper bunk. He climbed up, sat there as though he were behind a set of controls, and said, "Let me drive this bulldozer!"

The youth, who had been working the past summer on a construction gang, was a sleepwalker. More than once, he had gone on these night rambles, usually winding up with the same ghostly performance. It bothered his dormitory mates until they had a chat with the college doctor.

Sleepwalking, the boys were assured, is fairly common. Every night, all over the country, people arise without waking, wander through the house, even venture outdoors for miles before getting back—often with the help of others—to their beds.

***Sleepwalkers are careful.*** In their strange midnight parade, sleepwalkers usually make their way quietly and carefully from room to room, as did the college student in his dorm. They go up and down stairs, draw bolts or turn keys, open doors. In some cases the acts are more complex: They sit down and write letters, or play the piano, or do school homework.

Occasionally, they get out of windows and inch along narrow ledges, or stroll to the neighborhood corner and cross unharmed through traffic.

Reports of the weird rovings of sleepwalkers—or somnambulists, as they are called—are known to almost every family doctor.

An Iowa farmer, who had won blue ribbons at the county fair for his crops, got up on summer nights, slipped his overalls on top of his pajamas, and ambled along between the moonlit rows of corn, patting the fresh, green blades.

At Camp Lee, Va., a 19-year-old soldier put on his dress uniform and went tramping across the black countryside, looking for an uncle.

A Tampa, Fla., metallurgy assistant, who regularly took two bananas to work in his lunch box, often wandered from his own house to his mother's kitchen next door and ate a dozen before returning to his bed.

A Los Angeles youth fell from his second-story window, bounced off an awning, broke his wrist, and then walked for five blocks before his family caught up with him and awakened him.

*An Iowa farmer got up on summer nights and ambled along the rows of corn.*

*A Florida man often wandered over to his mother's kitchen next door and ate a dozen bananas.*

CONTINUED



Copyrighted material

*A New Jersey man was found one night starting to climb up from the window of his sixth-floor apartment.*

Physicians say there are from 2,000,000 to 4,000,000 sleepwalkers in the United States. But exact statistics are difficult to gather; many persons are reluctant to report the experience.

***A "dream acted out."*** Sleepwalking is an eerie state between waking and sleeping. It is sometimes described as a dream that is acted out. Doctors say it is an "abnormality of sleep" that usually comes when sleep is the deepest—within the first two hours or so after you drift off. It is most evident among young persons; at least it is most often reported then. A short-circuit occurs somehow in the sleep mechanism, and the sleeper is moved to unconscious action that he seldom recalls later.

The body, in sleepwalking, is directed by the submerged mind. The somnambulist, however, keeps a fairly normal sense of touch and balance. He deftly steps around a chair or coffee table and other objects in the room, and he avoids fences and other obstacles outside. He seems to know just where he is going on his nocturnal journey.

The wandering soldier at Camp Lee, according to Army psychiatrists, was out on a definite search. The uncle he was looking for had taken care of him as an orphan. This memory in his subconscious sent him out seeking the only family love he had ever known.

Hopes, fears, desires, worries, all stored deep within the mind, are among the remote causes that can trigger sleepwalking. Physicians also speak of more immediate causes: blood-and-thunder television shows, spine-chilling stories, or disturbing experiences that occur shortly before you go to bed.

*She drove away in her husband's auto and woke up beside the freeway, 23 miles from home.*

***Who are they?*** Sleep walkers are usually active persons; for the most part, they are in good physical health. A study by Navy doctors showed that somnambulists were chiefly of average or high intelligence. Other studies, too, reveal that sleepwalkers are usually well adjusted on the surface. But underneath they may be hiding strong yearnings and conflicts.

The West Virginian collegian, for example, did not really want to study law, as he was doing; he was being pushed into it by his parents. He dreamed, instead, of the life of a highway contractor.

A New Jersey textbook salesman was found one night starting to climb upward from his sixth-floor apartment window. Later he explained to friends, "I guess I always admired mountain climbers."

***Unseeing eyes.*** Although a sleepwalker is "out of this world," he gives the appearance of being awake. His eyes are open, but he does not "see" in the usual sense. If you

[*Continued on page 216*]



Copyrighted material

***Here's an exciting breakthrough in the art of free-flight models***

# Flying the New Electric-Prop Planes

**By Howard McEntee**

THERE'S a new thrill in store for pilots of free-flight model planes—the new electric-motor jobs. The motors are tiny jewels, smaller in diameter than a quarter. Penlight cells run them.

The motors are sold for use with two imported model-plane kits, one from Germany and one from

CONTINUED

Copyrighted material

## About the Author

**Howard McEntee,** one of the foremost authorities on model airplanes, was the logical choice to test-fly the exciting new electrics for POPULAR SCIENCE. A former editor of *Model Airplane News,* he parlayed a childhood knack for folding paper airplanes into a 40-year career as an expert on all types of model planes. When he isn't flying them at his Ridgewood, N. J., proving grounds, he's writing about them as Radio Control Editor of *American Modeler.* The most popular of his several books, *Radio Control Handbook,* is considered the bible of its field.

Japan. The planes are gauzy frame-and-tissue affairs, designed for low weight, with big gliderlike wings for high lift.

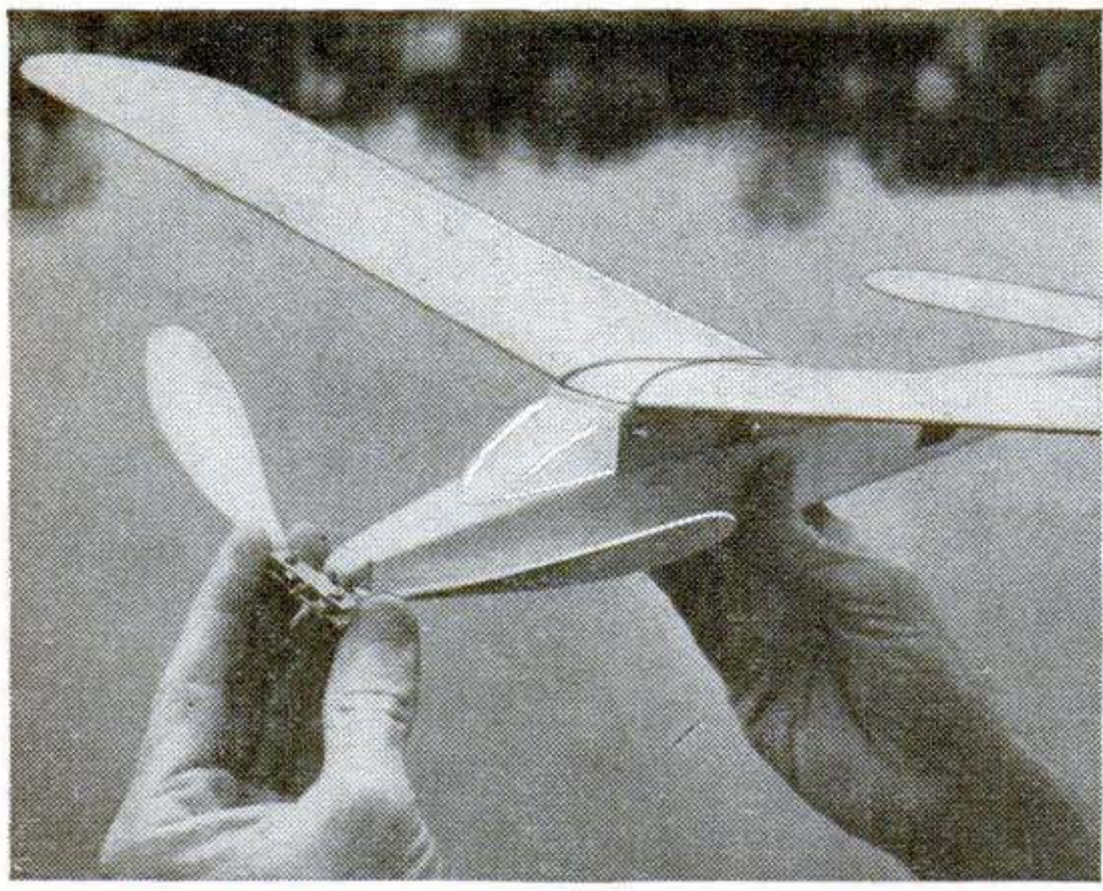
***A new challenge in skill.*** Gas-prop planes have enough excess power to overcome sloppy construction; electric planes don't. Their much lower prop torque demands an absolute minimum of weight and a maximum of lift. This calls for real model-building skill—the same skill you needed years ago to build a successful rubber-band model.

Cement must be used sparingly to save weight; wings must be pinned flat during assembly to prevent power-robbing warps; the tissue covering must be free of lift-killing wrinkles. You may even want to forego the usual gleaming—and heavy—paint job.

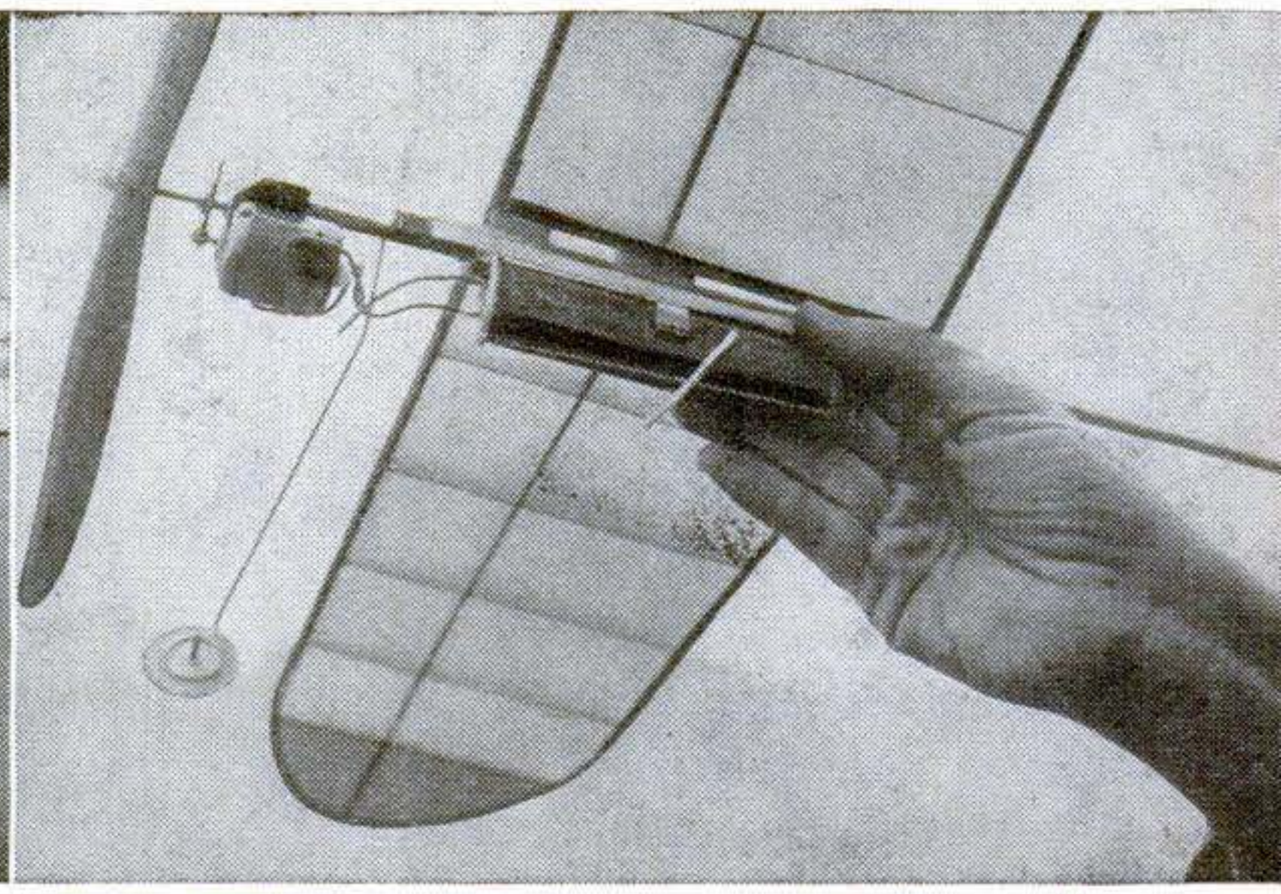
Flight techniques also represent a return to the challenge of rubber-band days. Because the batteries last only a short time under constant drain, the objective is to get the plane to a high altitude and then cut the motor with a timed fuse. The prop then folds or disengages and the plane returns to earth in a flat, graceful glide—actually a longer powerless flight than the original climb.

***The power plants.*** The tiny motors require only about four volts and weigh less than an ounce in the case of the German model and about 1½ ounces for the Jap one. Their high-speed rotors, spinning up to 18,000 r.p.m., are geared down through miniature watchlike power trains to drive big-bladed propellers. The midget motors have been made possible only since the war—with the development of more powerful batteries and permanent-magnet motors that eliminate bulky field coils.

The German motor, called the Mikromax T 03/15, has a 15:1 reduction and drives a whopping 12¾″-long prop at about 1,200 r.p.m. Its design is unusual.



**HINGED PROP BLADES** fold flat against the fuselage of this German model as soon as power is cut so that the plane will glide freely without wind resistance. The trim fuselage, plastic canopy, and large wings give the five-ounce ship a graceful, gliderlike appearance.

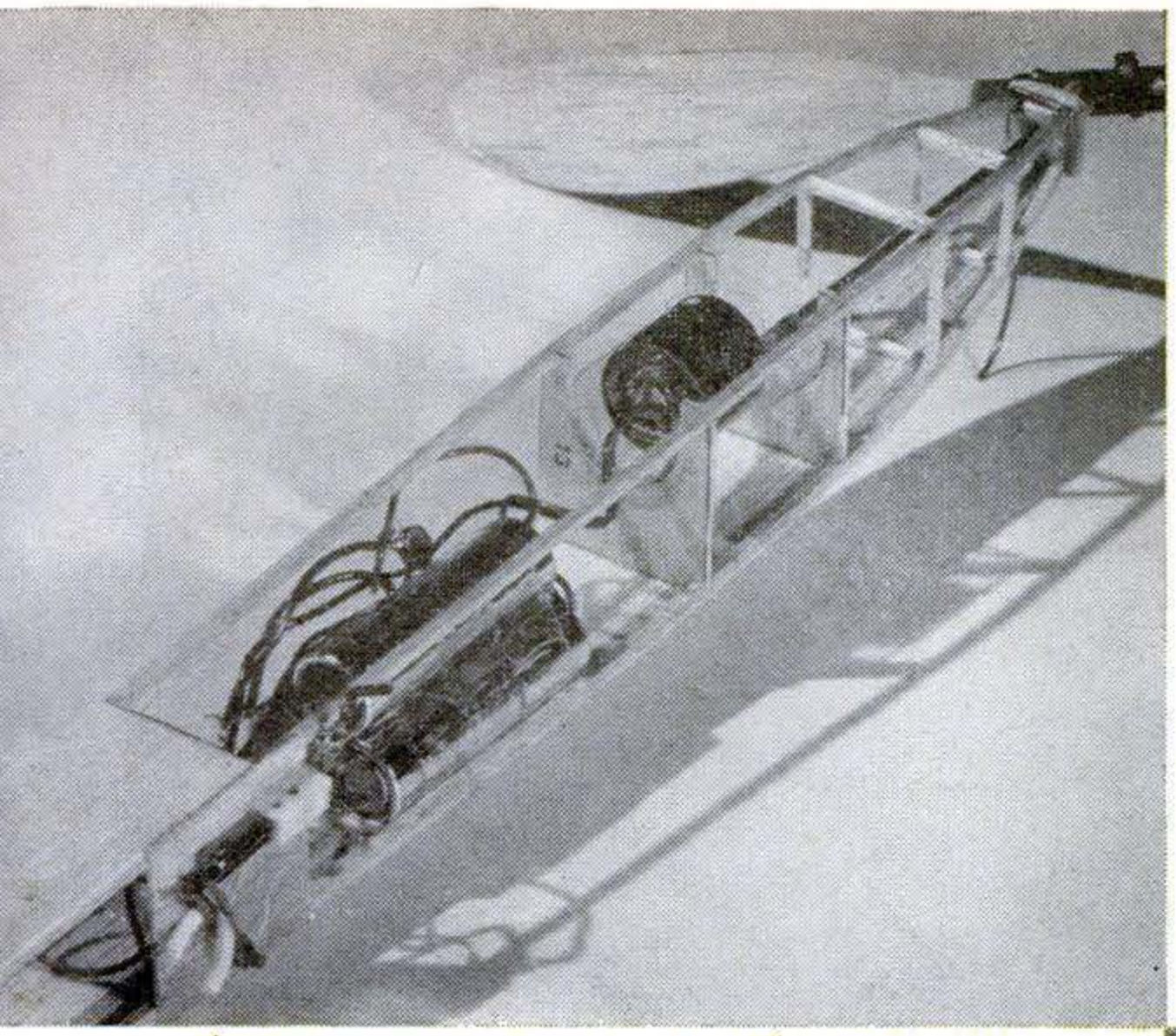


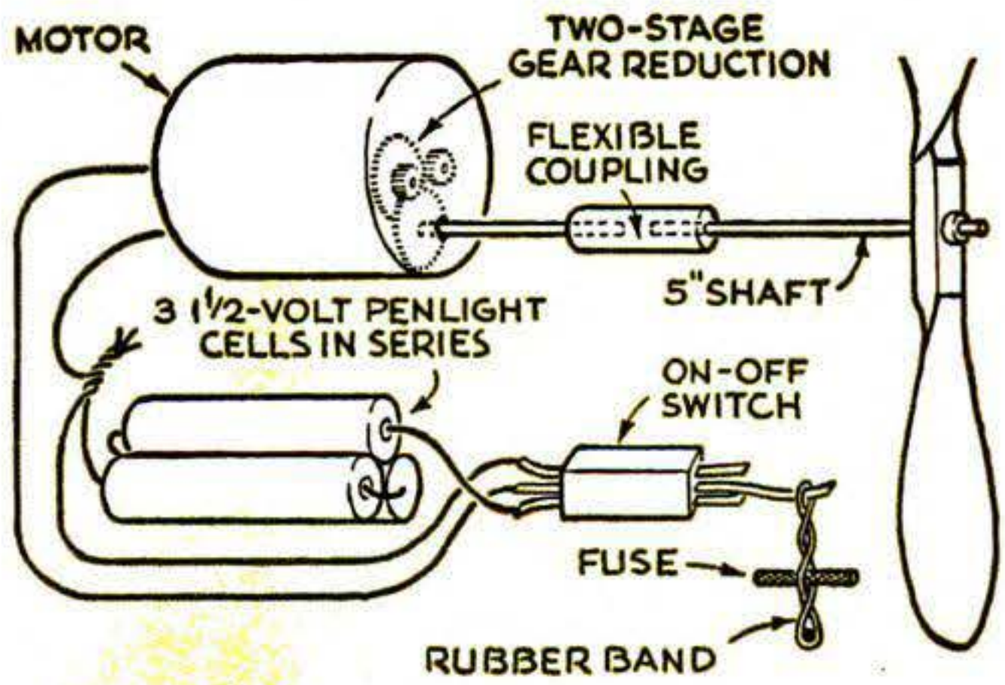
**SLIM, STICK-TYPE "FUSELAGE"** on the Jap-made model is designed to save weight. Fuse inserted in a rubber band on the battery case opens the switch to cut power after a preset time. Note single nose wheel to protect prop on landings, replacing heavier conventional gear.



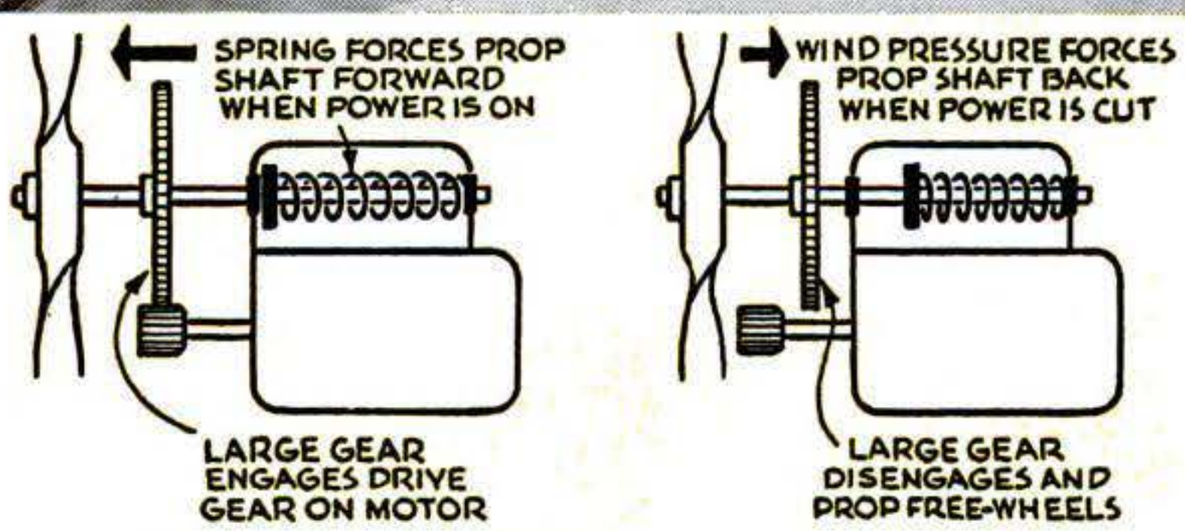
Copyrighted material

## *Tiny, ingeniously complicated power plants drive the models*

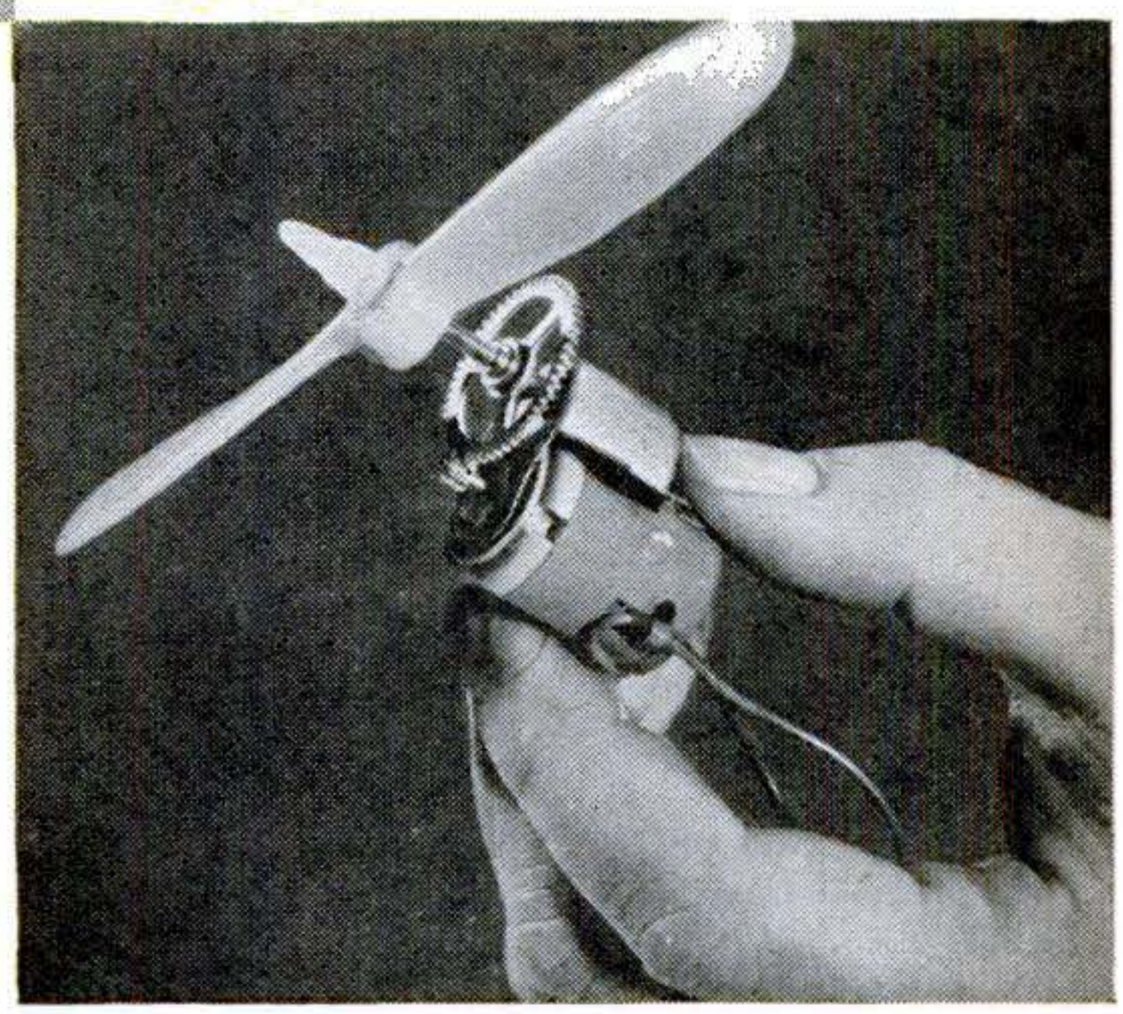





**LONG DRIVE SHAFT** connects prop to motor in German model. Note the simple flexible coupling—just a length of rubber tubing—for smooth starts. Watch-size gears, shown in sketch above, are hidden inside motor housing, drive prop at a 15:1 reduction. Motor switch, on outside of fuselage, is held closed by a fused rubber band.




**SINGLE LARGE GEAR** on a countershaft above the Jap motor drives the prop at about 7:1 reduction. Countershaft is spring-loaded, as shown above, so prop shaft engages drive gear when power is on. When power is cut, wind pressure forces the prop back against the spring so it disengages the drive gear. Prop then free-wheels so plane will glide without drag.



The permanent magnet is located *inside* the armature windings in place of an iron core. The outer casing is an iron core that completes the path for the magnet. The motor has such other exotic features as a silver commutator and gold-alloy brushes. It's said to have an efficiency of 75 percent without gears—an astonishing figure. A clever flexible coupling between the motor shaft and the prop shaft enables the motor to take up the load without shock.

The Jap motor, called the AP-35, has a gear reduction of about 7:1 and spins a shorter 9½″ prop a little faster, at about 1,500 r.p.m. It's somewhat less powerful than the German motor, but it has sturdy bronze bearings and modern ceramic magnets.

The motors do not come with the model-plane kits and must be bought separately. It's important to get the right one for each model as there are other miniature power plants made for different purposes. In some cases, the propeller must also be bought extra.

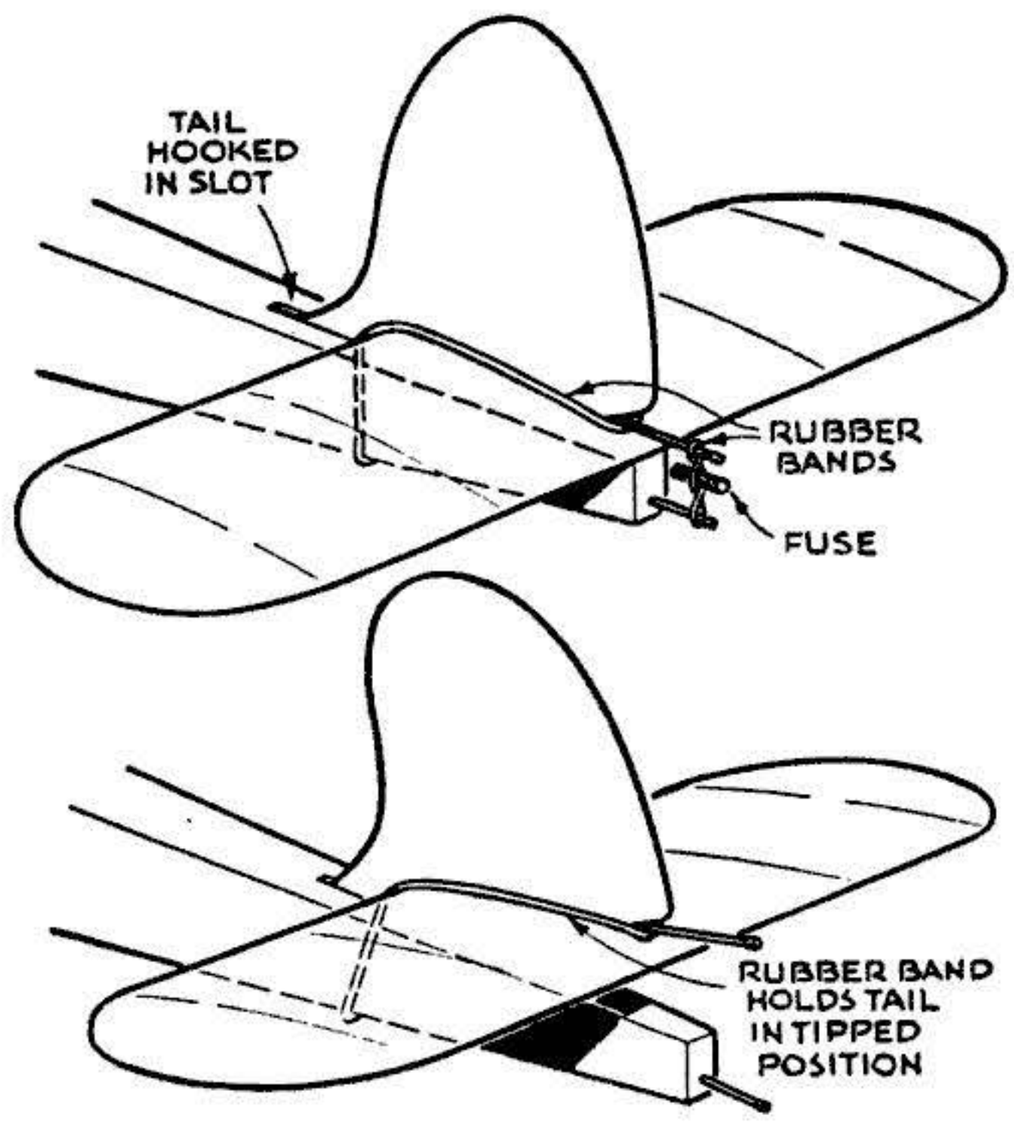
***What the planes are like.*** The German model, called Silentius, has a wingspan of 30″ and weighs less than five ounces, including power plant. It's the fancier of the two, having a true fuselage with a trim, gliderlike appearance. Total cost for the kit, motor, and prop is about $15.

The Jap model, known as the TK-1, is bigger, with a 38″ wingspan, but has a more primitive sticklike fuselage reminiscent of early rubber-band models. This, however, makes it considerably cheaper

CONTINUED



Copyrighted material




**HOW "DETHERMALIZER" WORKS:** Tail on German plane is held down by a fused rubber band, as at top above. When the fuse burns through the rubber band, the tail pops up, as at bottom. This quickly destroys the plane's ability to climb, bringing it safely back to earth.

—less than $6 including motor—and also simplifies assembly. It weighs about 6¾ ounces ready to fly.

The parts in the Jap kit are already cut out for you; those in the German kit aren't. Both kits come with complete instructions in English.

***Electric power vs. gas.*** The new planes are no competition for glow-plug models and aren't intended to be. They have their own special charms. They're not temperamental; they start instantly in any weather. They fly as soundlessly as the breeze, never run out of fuel, and eliminate the fire hazard of working with hot fuels. Their flight is leisurely and enjoyable; you don't spin yourself dizzy on the end of a control line. When a mishap does occur, they don't screw themselves into the ground with the ferocity of a gas-prop job.

The safe and quiet operation of electric models is opening up new possibilities for model-plane sport in communities that frown on the gas-engine types. Their gentle nature permits meets to be held in gyms and armories without dependence on fair weather.

On the minus side, the planes require some pampering. They do not have enough power for ROG (rise-off-ground) takeoffs; you must launch them by hand. They also require calm air to fly successfully—"electric-flight weather," as hobbyists have dubbed it. Because the batteries run down so quickly, you're restricted to fairly short power-on periods—about 20 to 30 seconds—if you want the cells to last. The motors may also heat up and become damaged if they're allowed to run too long.

The German plane has a climbing rate of three feet a second, which its designer, Fred Militky, says is "not spectacular" compared to what future developments in electric power will bring. Still, it seems adequate enough considering that Militky's first successful model flew clear away after climbing for five minutes. Militky, incidentally, tried more than 250 different designs over an 18-year period before finally coming up with a reliable model.

***How power is controlled.*** The shut-off switches in both planes are held in the On position by a rubber band with a short fuse inserted in it. When the fuse burns down, it melts the rubber band and releases the switch, shutting off the motor.

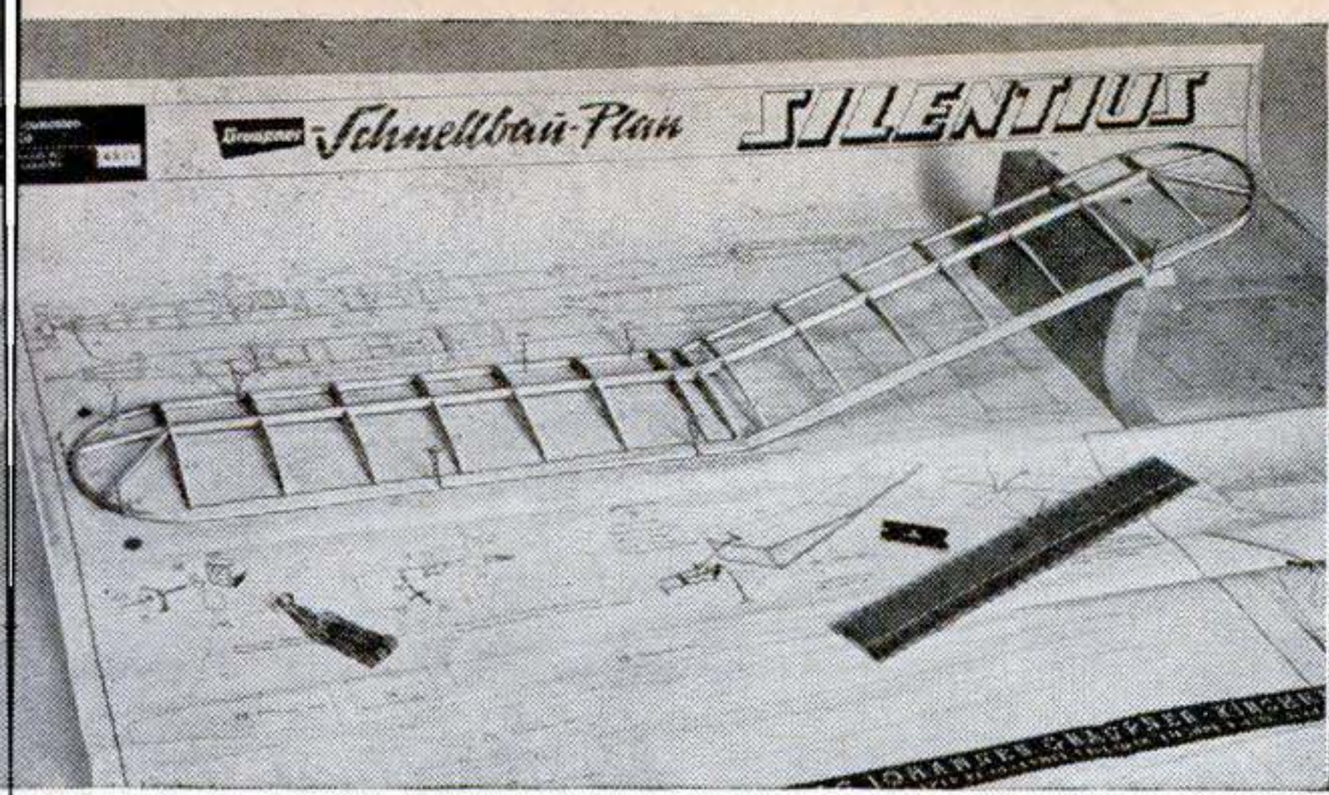
The German plane uses a second fuse to operate a "dethermalizer." This is designed to keep the lightweight plane from being swept aloft by rising thermal air currents and becoming lost. The entire tail section is pivoted and is held down by a fused rubber band. When the fuse burns through the rubber band, the tail pops up at a steep angle. This destroys the plane's ability to climb, but without making it crash. It descends rapidly but gently, something like a parachute.

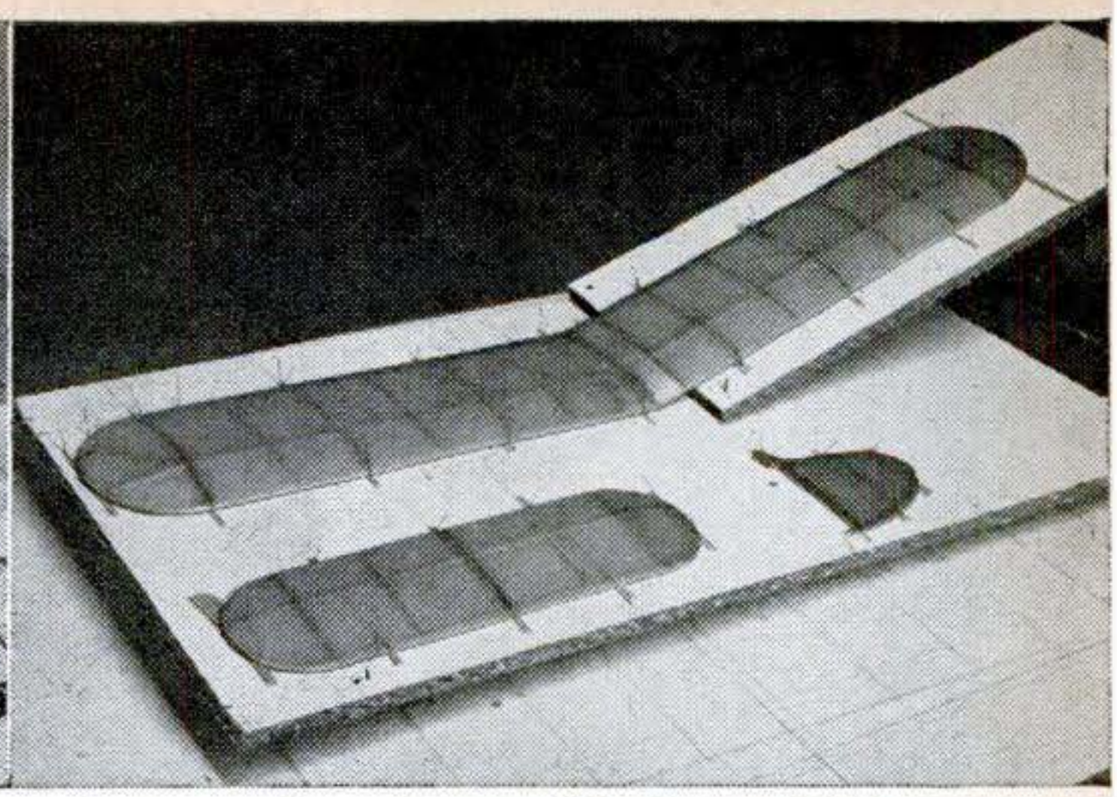
Fuses are included in both kits, and the length you use determines how long the power stays on. On one of the models shown here, a miniature pneumatic timer (Elmic Mini-Diesel, available at hobby shops) was used in place of the fuse arrangement. This adds a little extra weight, but is handier to use and more reliable than the fuses. The dethermalizer is usually needed only on very hot days or when you're trying to break altitude records.

***Getting long, graceful glides.*** Both power plants have ingenious devices for reducing the drag of the prop after power has been shut off, so the planes will glide freely.



Copyrighted material



**WINGS ARE THE TRICKIEST** to assemble, must be absolutely true for good lift. To insure perfect alignment, parts are pinned down over **plans supplied in the kits until glue sets, as** above at left. Gauge block establishes correct dihedral angle. At right, wings and tail are also pinned flat after tissue is applied to pre**vent warps as the covering shrinks.**

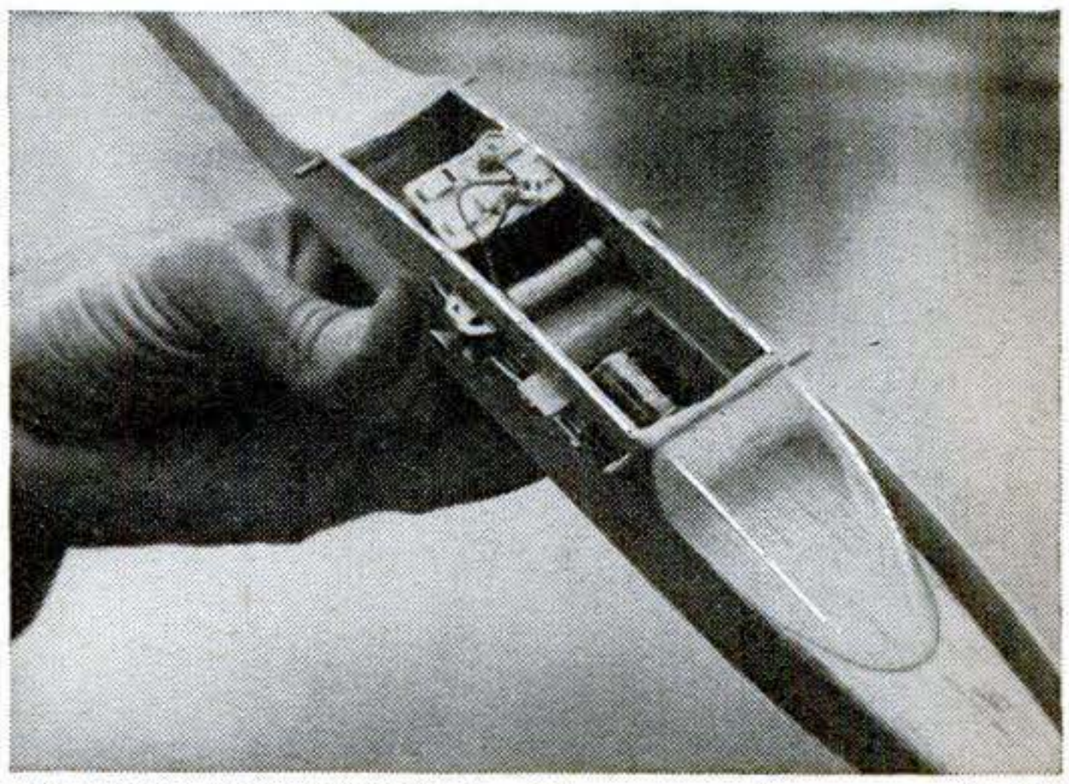
The giant German prop is a "folder"—its blades, pivoted at the hub, automatically swing back against the fuselage when power is cut so they offer less wind resistance. When the switch shuts off, it also shorts out the motor, stopping it immediately without any over-run. This gets the prop stopped and folded instantly for an unrestricted glide.

The Jap motor has a disengaging device that allows the prop to freewheel during a glide. The prop is spring-loaded so that it engages the drive gear during powered flight. When power is cut, wind pressure overcomes the spring, disengaging the prop and permitting it to spin freely without resistance.

***What kind of batteries?*** Both planes will run satisfactorily on ordinary 1½-volt penlight cells. The German one uses three, wired in series, for a total of 4½ volts. The Jap model uses four cells in series to get six volts. In tests, the German motor drew 1.6 amps and the Jap 1.7 amps—a remarkably high drain to impose on tiny flashlight batteries.

Because of the high drain, several other types of batteries are recommended for longer life. Photoflash batteries in the penlight size will deliver high power in short bursts for brief flights. Still more durable are the newer alkaline cells, such as Eveready's E-91. These cost somewhat more than standard cells, but will give many times more flights.

The German plane, with more cockpit space, is designed to take another type of special battery. This is a lead-acid cell called Rulag RL-4, made for use in electric cigarette lighters. It costs about



**ROOMY "COCKPIT"** in German plane can hold cigarette-lighter batteries instead of penlight cells for greater power. Tiny pneumatic timer on fuselage was added by the author to make power control more precise than with fuses.

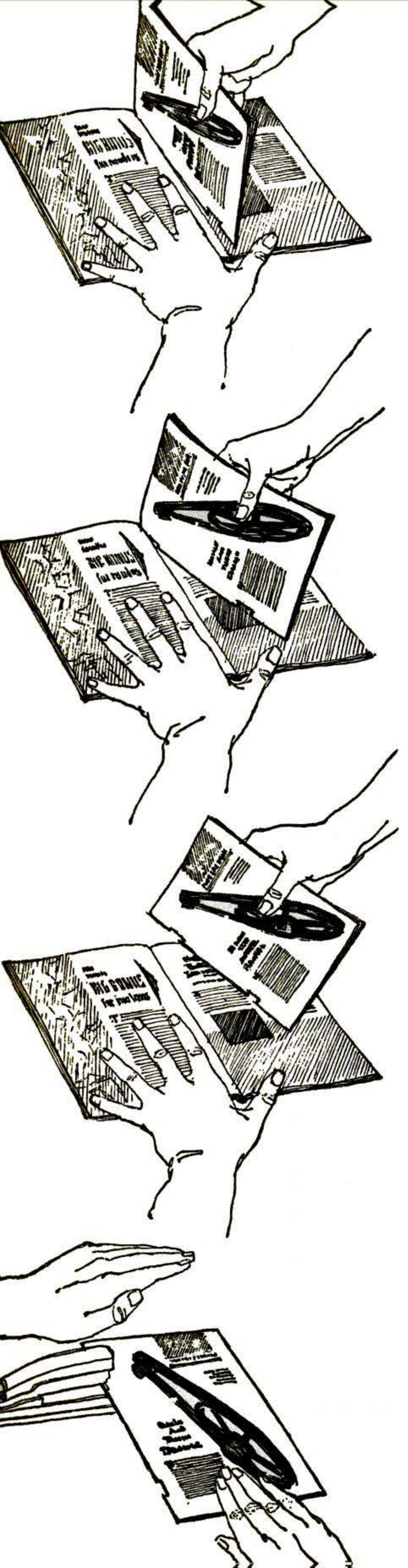
75 cents and is available at large cigar, jewelry, and department stores. Two Rulag RL-4s weigh 1¾ ounces and will provide 10 to 15 flights lasting about 20 seconds each.

Although the Rulag cells are not intended to be recharged, they actually can be charged a limited number of times in order to cut cost. Instructions for recharging come with the German kit. The Jap plane's battery holder is designed to take only penlight cells, so a special holder would have to be devised to carry the Rulags.

The kits can be obtained at many local hobby shops or from Polk's Model Craft Hobbies, 314 Fifth Ave., NYC. Other sources are Wilshire Model Center, 1326 Wilshire Blvd., Santa Monica, Calif., for the German plane, and Associated Hobby Mfrs. Co., 413 East Allegheny Ave., Philadelphia, for the Japanese model.



Copyrighted material



# Now... another BIG BONUS for readers

A NEW value-packed PS editorial feature begins on the facing page, the Save-It Section, a handy package of shop reference material. Lift it out of the magazine. File it away.

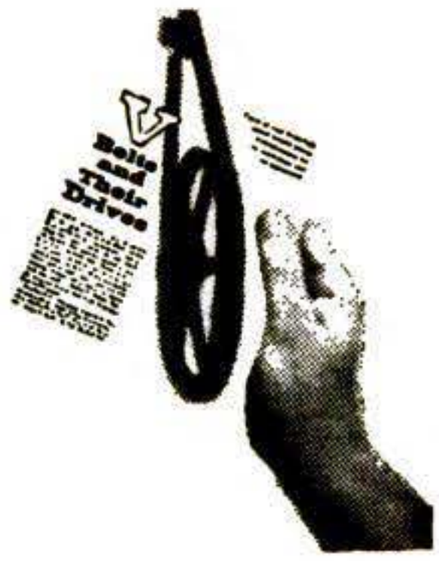
Other Save-It Sections will appear from time to time in future months, each with useful information packed into full-size pages that you can file away with the rest of your PS reference material. These Sections take their place beside other notable POPULAR SCIENCE firsts—the Bonus Booklets, the free Foldout Blueprints, and the regular tear-out departments that you can combine into your own home-repair manual: Fix-It File, Know-How File, Materials File.

The Save-It Section that follows consists of two sheets, each folded in the middle.

To remove the Section, pinch it together and carefully lift the end that's toward you, pulling gently but steadily to free it from the first staple through the magazine. (This will rip a small section from the fold, but you'll take care of this later.) Still lifting firmly, tear the Section free from the second staple—and the magazine. Finally, to make your Section a permanent addition to your shop reference material, staple it through the edges and, if desired, crease a strip of tape along this edge. Masking tape is fine for this. It won't peel off with time.



Copyrighted material





***Facts at your fingertips about simple power transmissions for house, workshop, and garden equipment***

# V Belts and Their Drives

EVEN automobiles can't do without V belts. Small wonder they're humming in the workshop, in home appliances, pumps, heating and cooling equipment, and powered garden tools.

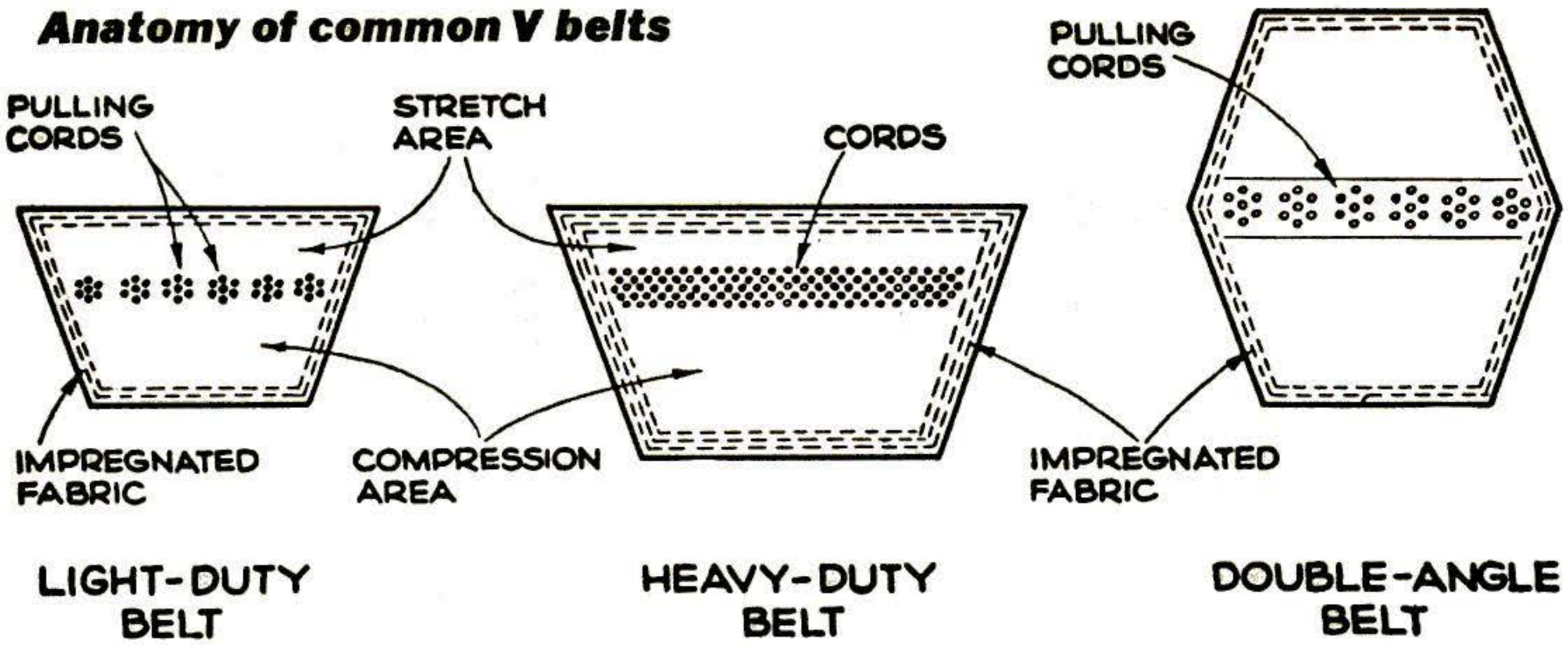
If you're setting up a power tool or building any motorized mechanism, you're likely to use a V belt somewhere. These fabric-and-rubber sinews are the simplest means of transmitting power from one shaft to another, besides offering easy means to brake, clutch, and even shift drive ratios.

Because of its thickness, a V belt going around a pulley has to stretch on the outside, squeeze together along the inside, and sustain a hefty pull in between. This

CONTINUED

Copyrighted material

## Anatomy of common V belts




pull, which carries the load, is taken by tough cords sealed into the belt carcass between the stretch and compression areas.

***How they grip.*** Thanks to the wedging action of their angled sides, V belts pull well even when wet. The section going around a pulley tends to bulge as it's bent, thus hugging the flanges tightly. Pinch the sides of a V belt hard with two fingers, bend it sharply with the other hand, and you can feel it flex its rubber muscles.

The angle between belt sides is 40 degrees; that between the two sides of the pulley (or sheave) groove is somewhat less to insure full wedging contact. The groove is much deeper than the belt, for a V belt must never ride the bottom of the groove. If it does, it loses almost all traction, no matter how taut.

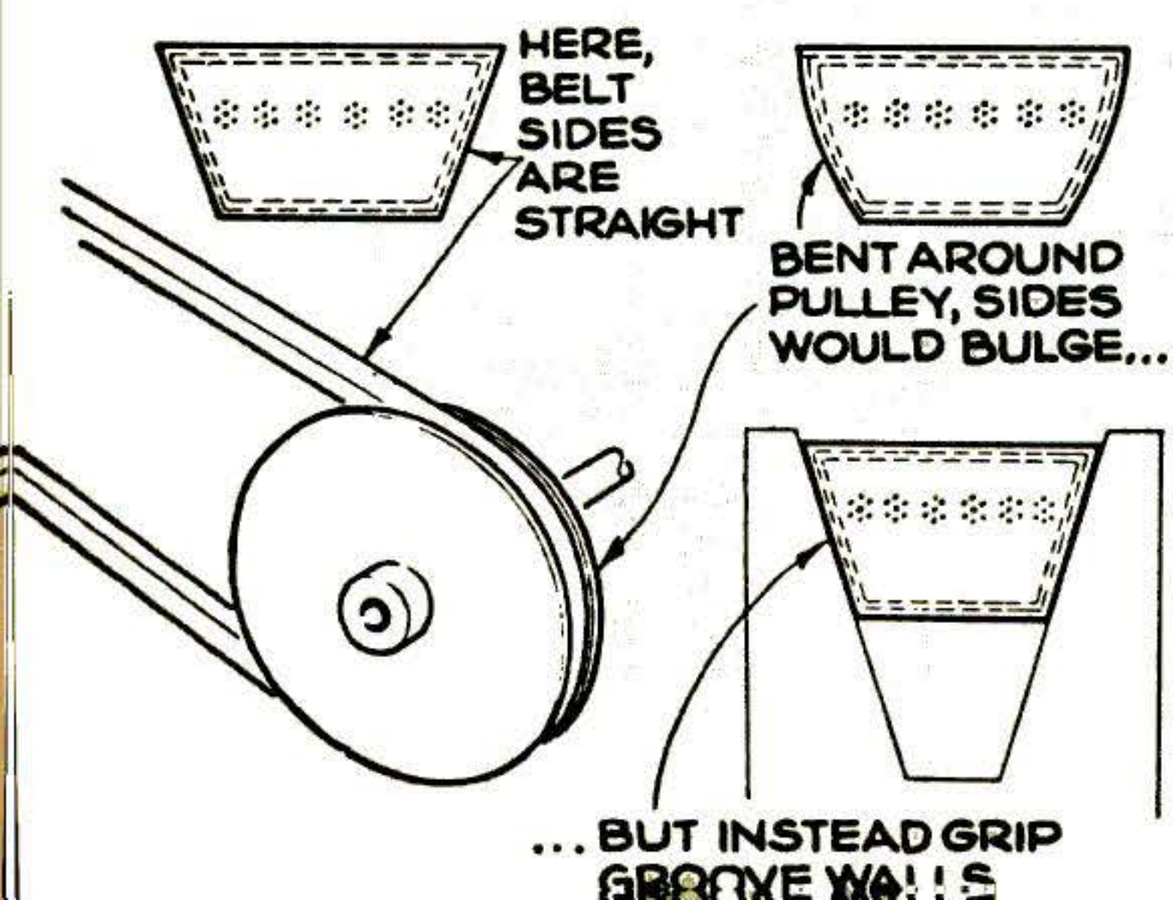
***Reading belt sizes.*** The commonest V belts are the ⅜″, ½″, and ⅝″ widths. But you'll rarely find these fractions on a belt. Markings usually show the width, duty type, and length in a simple code, but the code varies among manufacturers. In a typical marking such as 3L405, for example, the 3 stands for ⅜″ nominal width, the L for light duty, and the next three digits for belt length in inches—the last one in tenths of an inch (usually zero, meaning no fraction; or 5, for ½″). The 3L405 belt is therefore 40½″ long.

The letters O, A, B, and figures 2, 3, 4 are also used for ⅜″, ½″, and ⅝″ belt sections, sometimes indicating greater duty capacity than the L type in those same sizes. But load-rating designations are not standardized. Though sometimes called fractional-horsepower sizes, these belts under proper conditions can transmit several horsepower.

***Pitch diameter and length.*** Since a V belt has a definite thickness, what contact diameters on the pulleys should be used in figuring ratios? To calculate these and shaft spacing exactly, engineers use what they call the pitch diameter—the theoretical line at which the belt and sheave flanges travel together without any slippage. An accompanying table shows how much to deduct from outside pulley diameter to find pitch diameter.

Since pitch diameter lies inside the sheave rim, belt measurement around this line will be shorter than around the outside diameter. For accurate calculations, the difference is deducted from outside belt circumference as shown in another table. But belt markings usually give the outside length. (Exceptions are the markings on Dayton, Manhattan, and Browning V belts, which indicate inside length instead.)

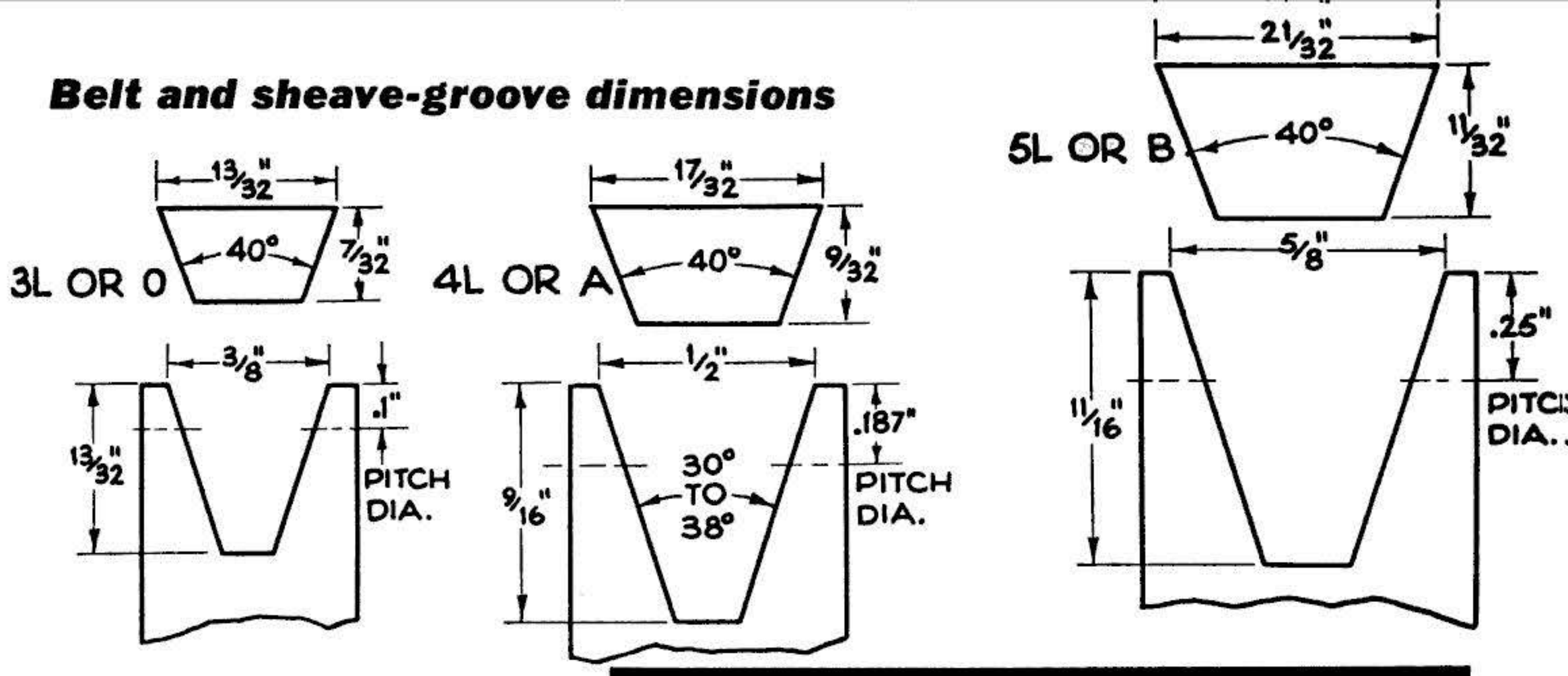
## How a V belt grips






Copyrighted material

## *Belt and sheave-groove dimensions*




**THE V-BELT ANGLE** is always 40 degrees, but groove angles vary with the size of the sheave, as in table at right. Should you machine your own pulleys, round off outer groove corners with a file. Finish the groove faces smoothly to avoid rapid belt wear, but don't round them.

**Included Groove Angle of Sheaves**

| PITCH DIAMETER | 3L Belt | 4L Belt | 5L Belt | Groove Angle |
|---|---|---|---|---|
| | to 1¾" | to 2 5/16" | to 4⅝" | 30° – 32° |
| | to 2⅜" | to 3⅛" | to 5¾" | 32° – 34° |
| | to 3 1/16" | to 4" | to 7" | 34° – 36° |
| | 3⅛" and up | 4⅛" and up | 7⅛" and up | 36° – 38° |

To buy a replacement, you can use the figures on the old belt. If they're not legible, don't measure the belt—it will have stretched. Pull a steel tape around the outside of the two pulleys, first slacking off the tensioning adjustment to one quarter of its take-up distance. You'll need the remaining three-quarters to take up the initial stretch of a new belt, and a little more from time to time, for V belts get longer—never shorter—in use.

Never buy a belt so tight that it has to be pried over the sheaves. This breaks the pulling cords inside. And buy the belt to suit the job. Among the special kinds:

- Heavy-service belts come with rayon, nylon, and even steel pulling cords. They can handle more power and run with greater tension than light-duty belts. They won't bend as sharply, of course, as lighter ones, and are more readily damaged if run on undersize pulleys.
- Narrow V belts are now familiar because of their use in modern cars. They're designed for high tension, high power transfer, and compactness—their narrow sheaves save on tight engine clearances.
- Open-end belts may be used where the common, closed V belt cannot be installed. The ends have metal fasteners joined by a pin, or a link and two pins.
- Cog belts have teeth on the inside, although used on plain pulleys. The notches between the teeth enable these belts to flex over smaller sheaves, making possible shorter centers and more compact drives. In some cog belts the teeth have flat bottoms for running efficiently in V-flat drives.
- Double V belts, hexagonal in cross section with the pulling cords in the middle, are designed to ride pulleys on both sides. A single serpentine drive with a double V belt can power several parallel shafts and even reverse rotation of one or more.

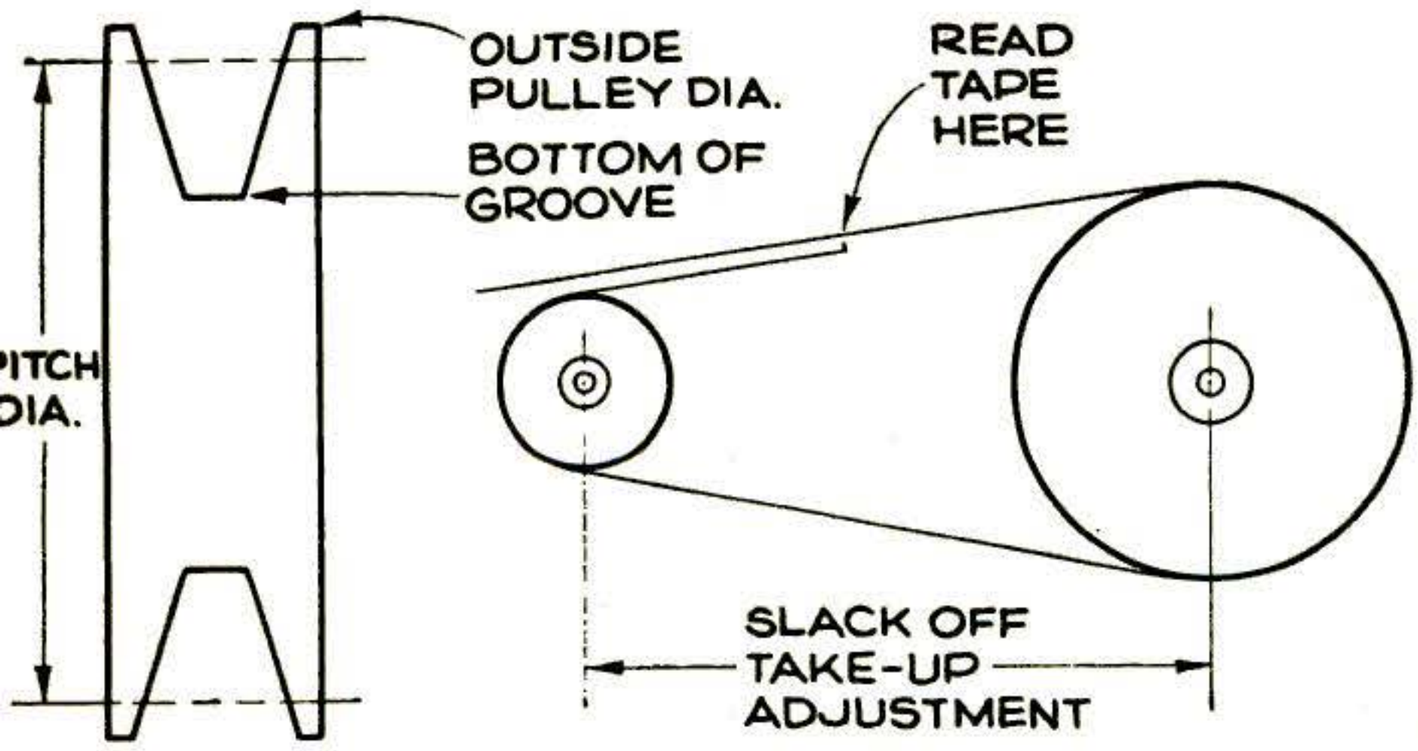
***Types of V drives.*** Commonest is the reduction drive, in which the power source turns faster than the driven shaft. Less common are these:

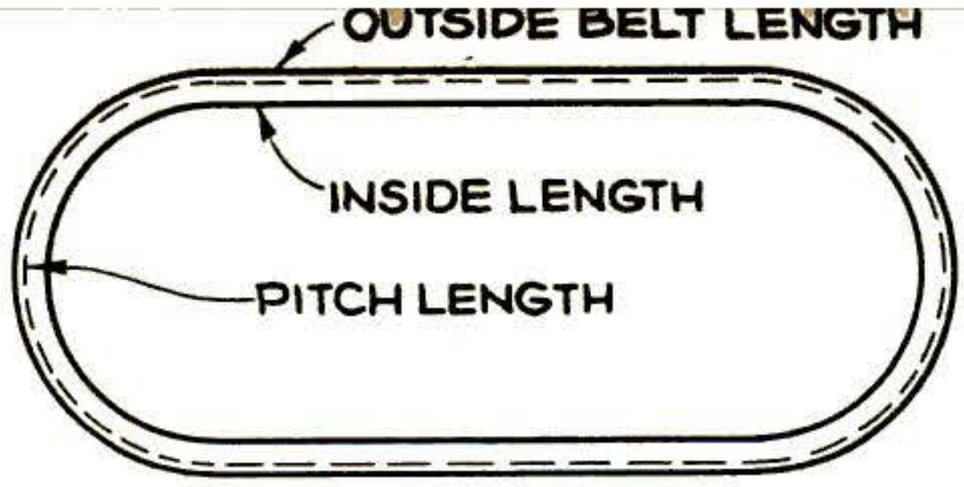
- The speed-up drive, where the load must run faster than the motor or engine, is considered harder on belts; manufacturers recommend figuring the drive with a little extra capacity. Circular saws are an example.
- The V-flat drive is a reduction drive with a V pulley on the motor and a flat one on the driven shaft. It's used in industry and on some lathe countershafts. To be effective, a V-flat drive should have a big ratio and short shaft spacing, to allow plenty of wrap-around on the sheave. The sheave should have a perfectly flat face—not a crowned one.

CONTINUED

Copyrighted material

## Pitch diameter and pitch length




**PITCH DIAMETER,** reckoned as that on which the belt tracks without slippage, lies inside the groove. To use it for precise ratio calculations, deduct measurement in the table at right from the outside pulley diameter. To find pitch length along line that rides pitch diameter, deduct amount given from the outside belt length. A rough measurement for replacement belts can be made by pulling a steel tape around the pulleys as in the diagram above.

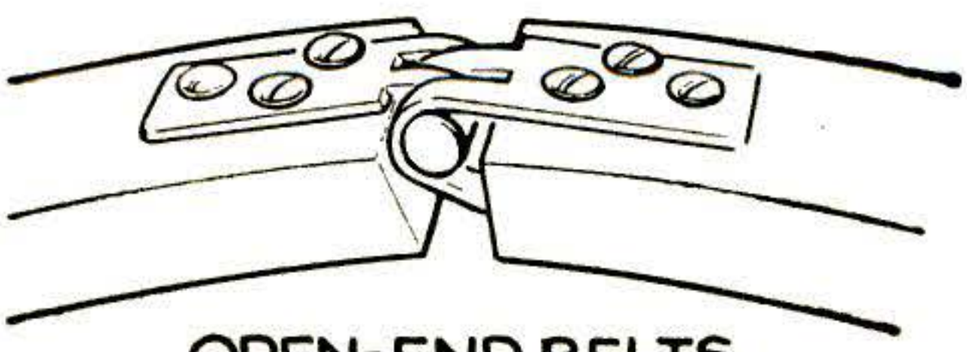
### Pitch Deductions

| Belt Size | Belt Pitch Length | Pulley Pitch Dia. |
|---|---|---|
| 3L or O | .7″ | .20″ |
| 4L or A | 1.0″ | .375″ |
| 5L or B | 1.2″ | .5″ |

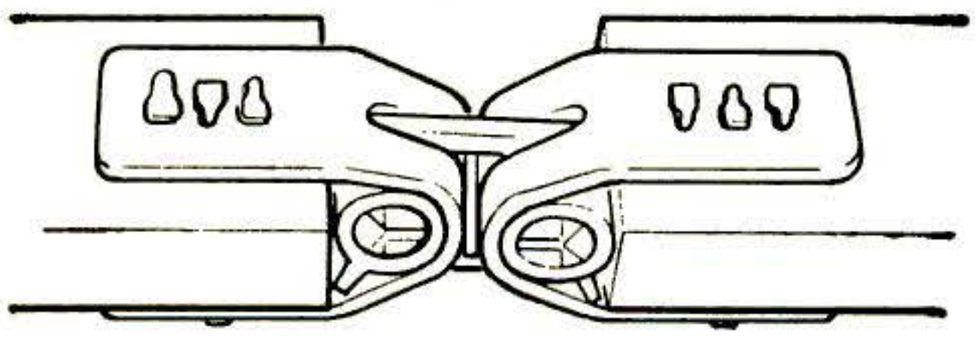
### Minimum Pulley Sizes

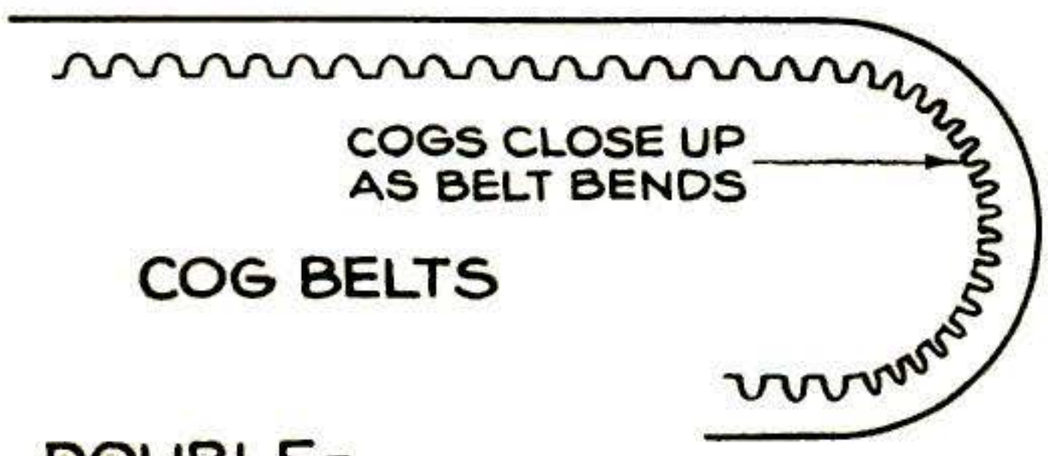
| Belt Size | Recommended Minimum Pitch Dia. | Absolute Minimum Pitch Dia. |
|---|---|---|
| 3L or O | 2.5″ | 1.5″ |
| 4L or A | 3.0″ | 1.8″ |
| 5L or B | 4.0″ | 3.0″ |

## Special types of V belts



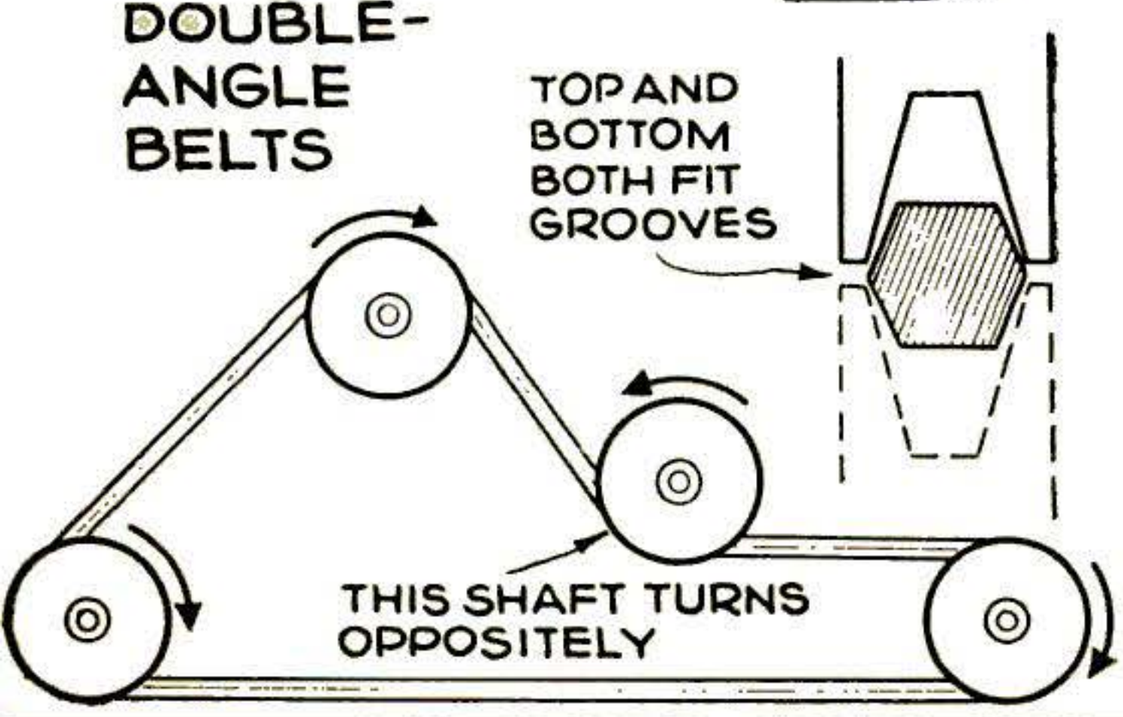
OPEN-END BELTS






COG BELTS

DOUBLE-ANGLE BELTS




- Quarter-turn drives (used on early rotary mowers to drive the vertical blade shaft from a horizontal-shaft engine) twist the belt through 90 degrees. Deep-groove pulleys should be used, and the shafts offset to bring the taut or pulling side of the belt more parallel to the groove at the smaller sheave. Mount the belt so that the tight side is at the bottom—so minimizing the sag that tends to pull it off the sheaves—and count on only 75 percent of the power capacity of a normal drive with the same belt-speed-sheave combination.
- Idler-angle drives between horizontal and vertical, or otherwise angled, shafts (from a bench-mounted motor to a drill-press spindle, for instance) subject the belt to two 90-degree twists. Distances from the idlers to both shafts should be generous. Deep-groove idlers should be used, as the makers of one popular compact car discovered after its fan belt persistently rode itself ragged in shallow ones.
- Dual and multi drives. Two 3L belts can transmit more power than a single 5L belt where shaft spacing and pulley sizes are limited. Some 10″ circular saws have dual belt drives; industrial machines may have multigrooved pulleys



Copyrighted material

with several ganged V belts. Belts pulling together should be matched—of the same make and length, or bought as a matched set—and replaced as a group, never singly.

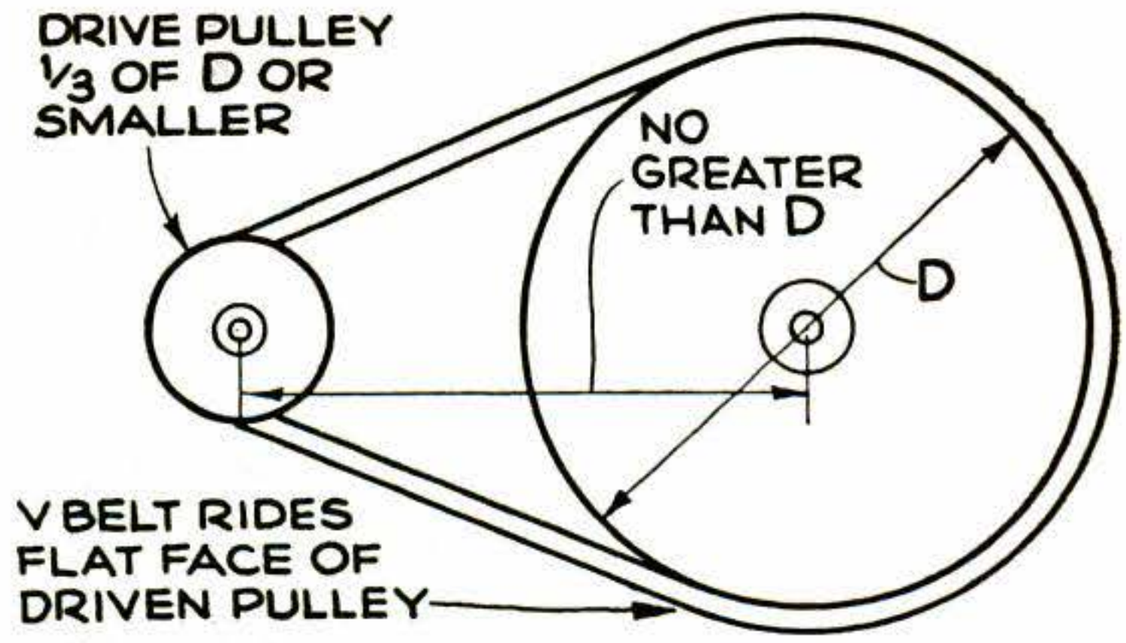
***Figuring your own drive.*** Rule One for full power capacity is to use the largest pulleys feasible. At 2,000 r.p.m., a 3 L belt on a 3″ sheave can transmit about ¾ hp., but on a 1½″ pulley less than ¼ hp. Too-small sheaves also cause excessive belt flexing and quick wear, especially at high speeds. This consideration usually limits ratios, and often requires a two-step drive. (Remember that the overall ratio of two steps is found by multiplying, not adding the individual ratios. Thus if one step is 2½:1 and the other 3:1, the overall is 7½:1.)

Figure each step separately. Choose pulley sizes to obtain the desired ratio and fit available space. Then multiply the diameter of either pulley by its speed, and multiply the result by .262.

This gives the surface speed of the belt in feet per minute. If it's more than 4,000 for small belts or 5,000 for ½″ and ⅝″ belts, try figuring with smaller pulleys that give the same ratio. This is a necessary compromise despite the lower efficiency of smaller sheaves, for at excessive surface speeds, centrifugal force tends to throw the belt out of the sheave grooves.

Now check belt speed and the diameter of the smaller pulley against the horsepower-rating table to find the load capacity of the drive. The figures given are

## V belts on flat sheaves




**COMPACT DRIVE** at right for 3:1 and higher ratios uses a flat-faced large pulley. It may be single-, dual-, or multi-belted. Ideal arc of contact on big pulley is 240 to 250 degrees.

for light-duty belts. The heavier-duty types will transmit considerably more power, especially at the higher speeds. Note that there is a power crest for any belt-and-pulley combination at a certain surface speed. Capacity is smaller at both lower and higher speeds.

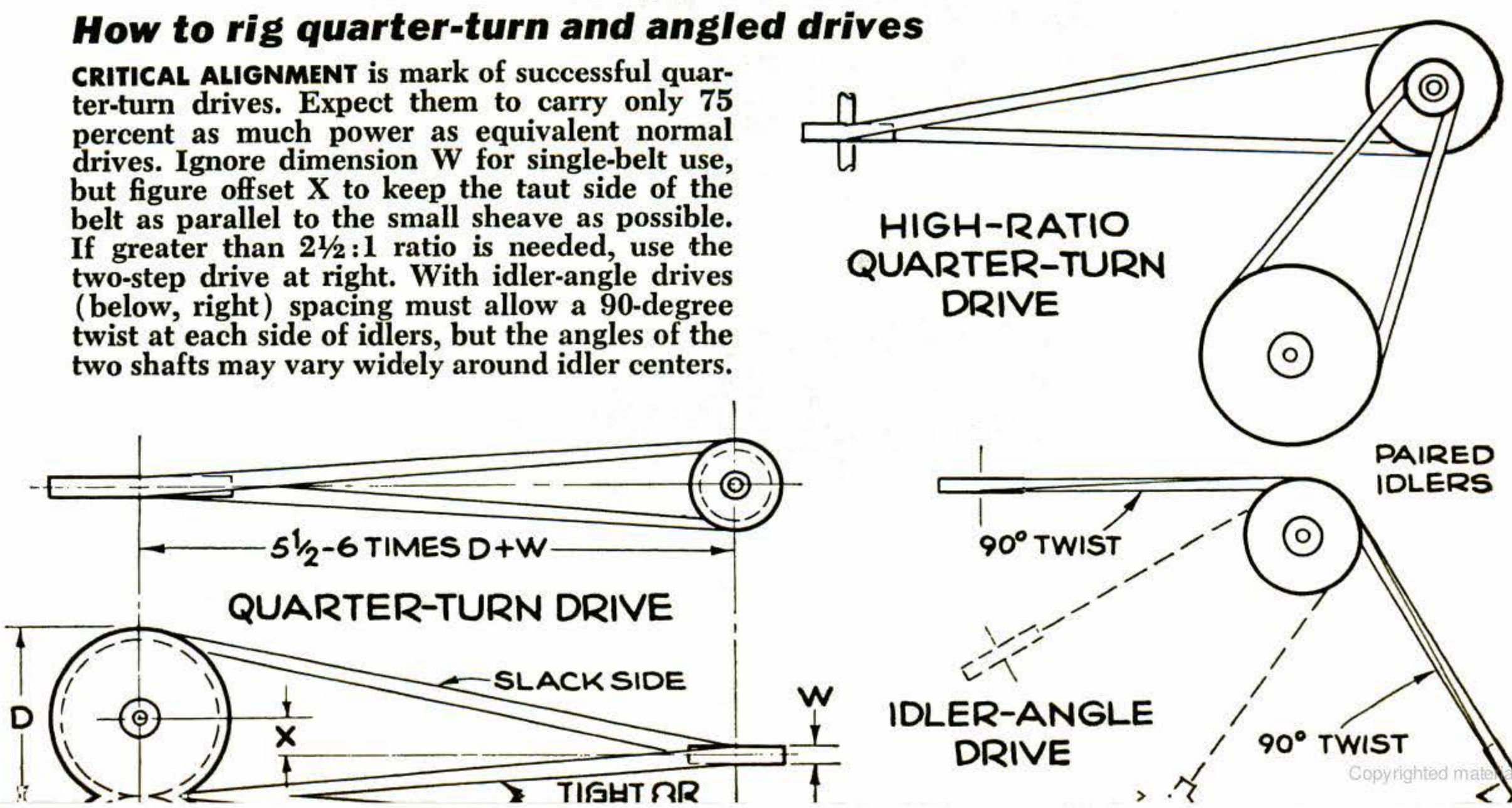
If the power rating is much less than required, the answer may be a special-duty belt, a heavier belt, or dual belts on double sheaves. If larger sheaves give excessive belt speeds or the wrong ratio, but smaller ones won't pull the rated load, a dual drive with smaller sheaves is the natural solution.

As the table shows, fractional-horsepower belts can handle much more than the term suggests. However, the figures are for easy drives, such as an electric

CONTINUED

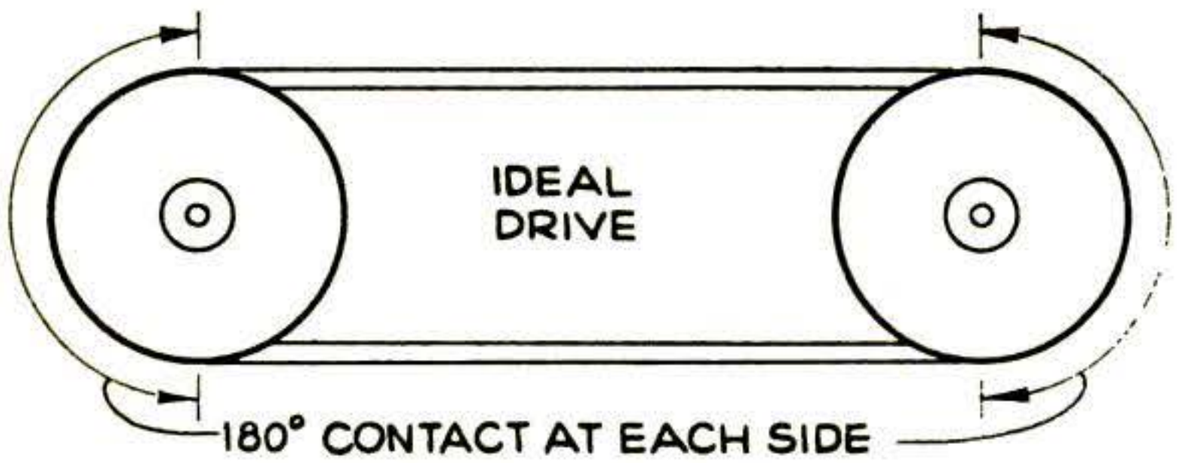
## How to rig quarter-turn and angled drives

**CRITICAL ALIGNMENT** is mark of successful quarter-turn drives. Expect them to carry only 75 percent as much power as equivalent normal drives. Ignore dimension W for single-belt use, but figure offset X to keep the taut side of the belt as parallel to the small sheave as possible. If greater than 2½:1 ratio is needed, use the two-step drive at right. With idler-angle drives (below, right) spacing must allow a 90-degree twist at each side of idlers, but the angles of the two shafts may vary widely around idler centers.

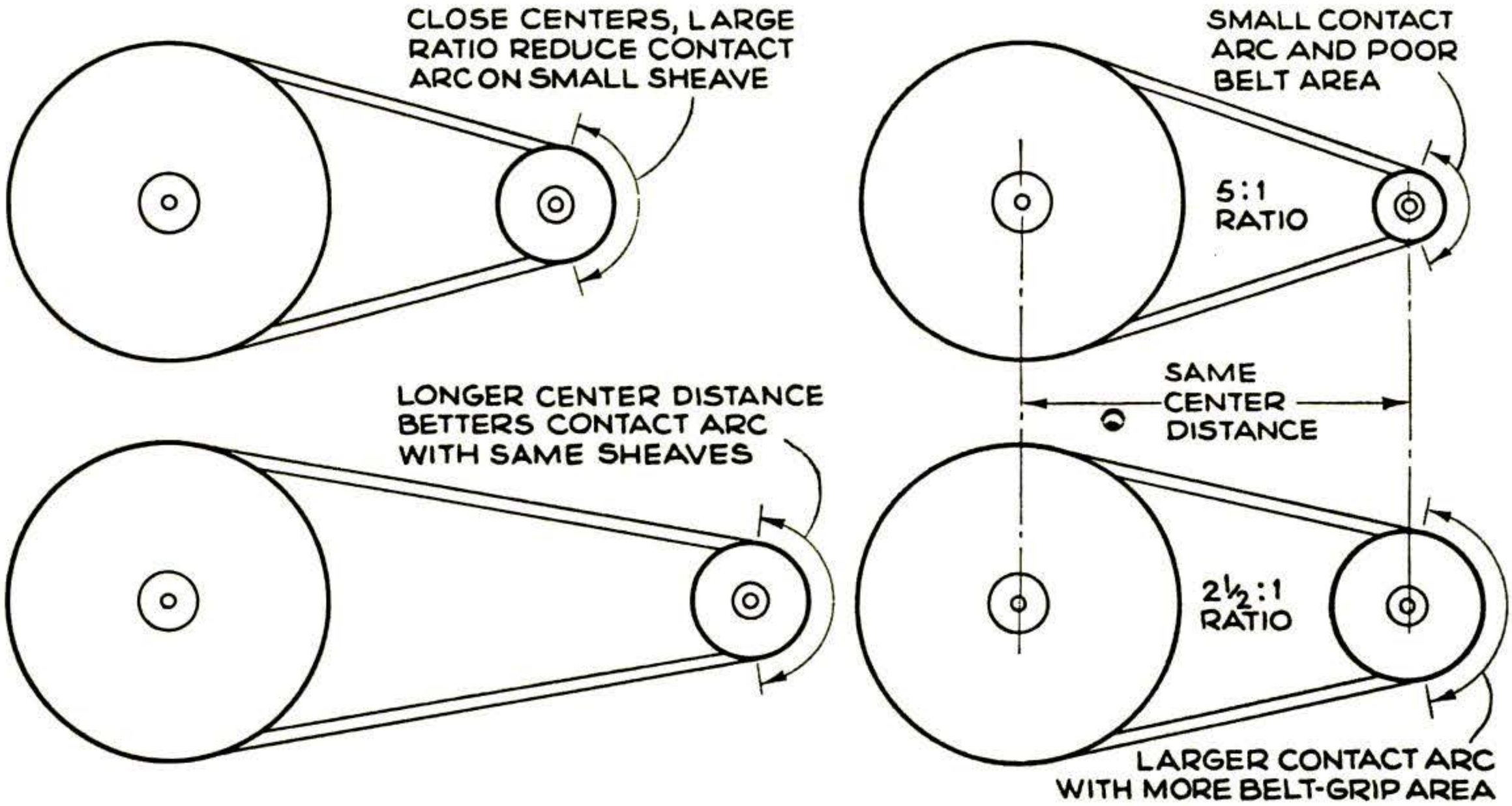



Copyrighted material

## How pulley dimensions affect power ratings




**FOR FULL POWER RATING,** keep the pulley ratio 3.1 or less (V-flat drives being the exception). Higher ratios (below) lessen the contact arc, introducing slippage and loss of power. The contact arc on the critical smaller pulley increases somewhat if the shafts are moved farther apart (below, left). Where a high ratio is required, it's best to use a two-step drive (that is, a countershaft) to avoid the use of excessive single-step ratios or an undersize pulley.



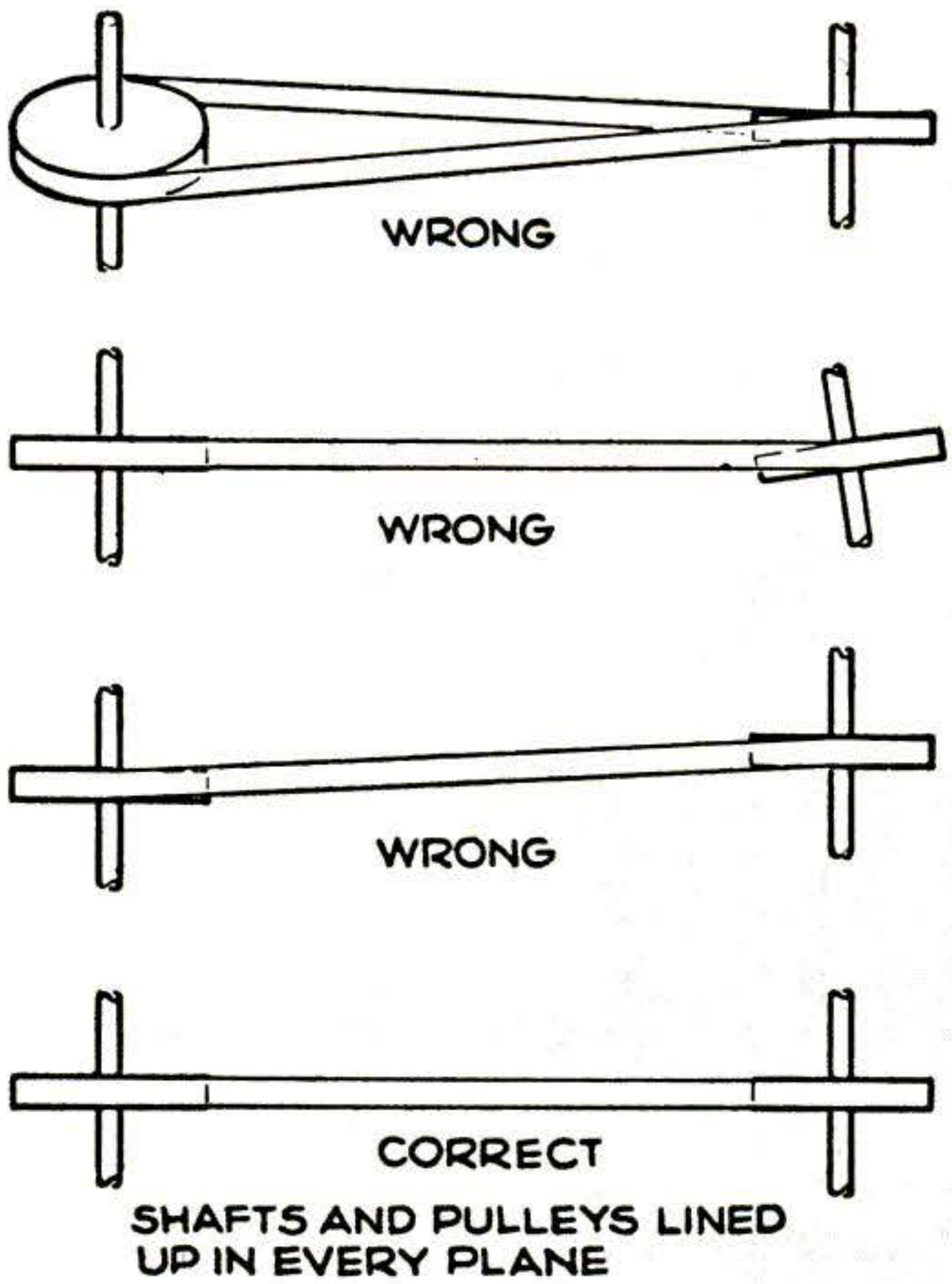

### Horsepower Ratings for Light-Duty V Belts and Pulleys

| Pulley Pitch Diameter | 3L Belts | | | | 4L Belts | | | | 5L Belts | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1.5" | 2.0" | 2.5" | 2.9" & up | 2.0" | 2.5" | 3.0" | 3.8" & up | 3.0" | 3.4" | 3.9" | 4.7" & up |
| BELT SPEED (feet per minute) | | | | | | | | | | | | |
| 500 | .12 | .18 | .22 | .25 | .19 | .31 | .40 | .49 | .34 | .48 | .56 | .72 |
| 1,000 | .19 | .32 | .38 | .43 | .30 | .55 | .71 | .88 | .60 | .83 | 1.02 | 1.28 |
| 1,500 | .22 | .42 | .53 | .59 | .34 | .72 | .95 | 1.20 | .75 | 1.06 | 1.37 | 1.76 |
| 2,000 | .23 | .49 | .64 | .72 | .34 | .82 | 1.14 | 1.47 | .78 | 1.20 | 1.63 | 2.13 |
| 2,500 | .21 | .53 | .73 | .83 | .28 | .88 | 1.28 | 1.71 | .72 | 1.26 | 1.80 | 2.42 |
| 3,000 | .15 | .54 | .78 | .89 | .15 | .87 | 1.36 | 1.87 | .58 | 1.23 | 1.87 | 2.63 |
| 3,500 | .03 | .51 | .79 | .92 | — | .81 | 1.37 | 1.97 | .34 | 1.10 | 1.84 | 2.73 |
| 4,000 | — | .44 | .76 | .91 | — | .67 | 1.31 | 2.00 | .01 | .84 | 1.69 | 2.69 |
| 4,500 | — | .32 | .67 | .84 | — | .44 | 1.16 | 1.94 | — | .42 | 2.15 | 2.53 |
| 5,000 | — | .10 | .50 | .72 | — | .15 | .92 | 1.78 | — | — | .96 | 2.22 |



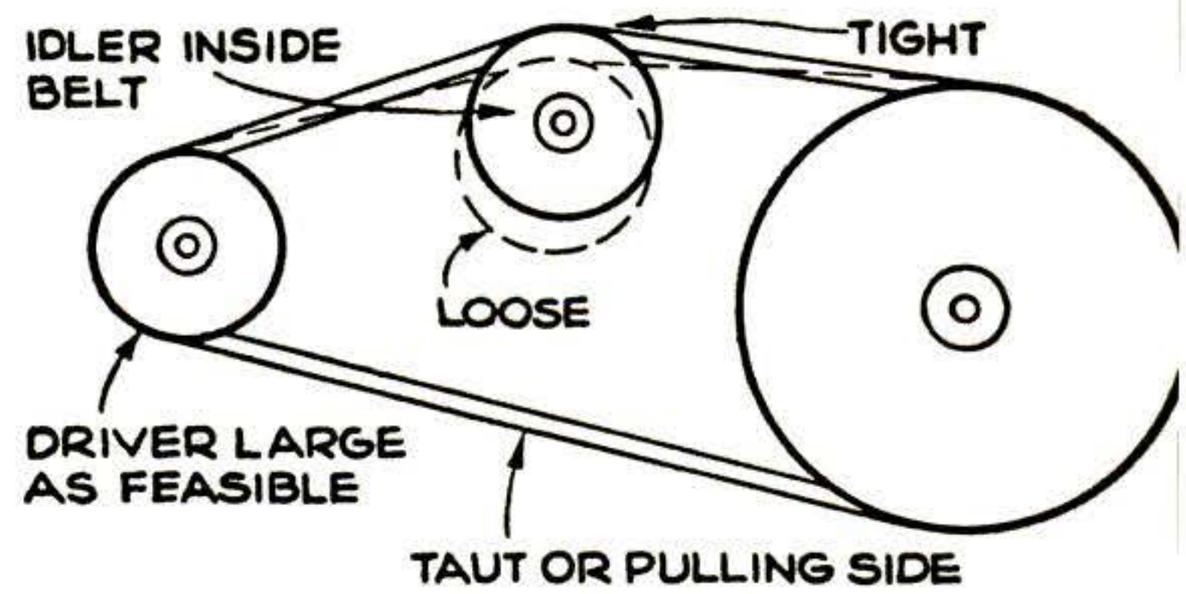
Copyrighted material

## Faults that wear out belts

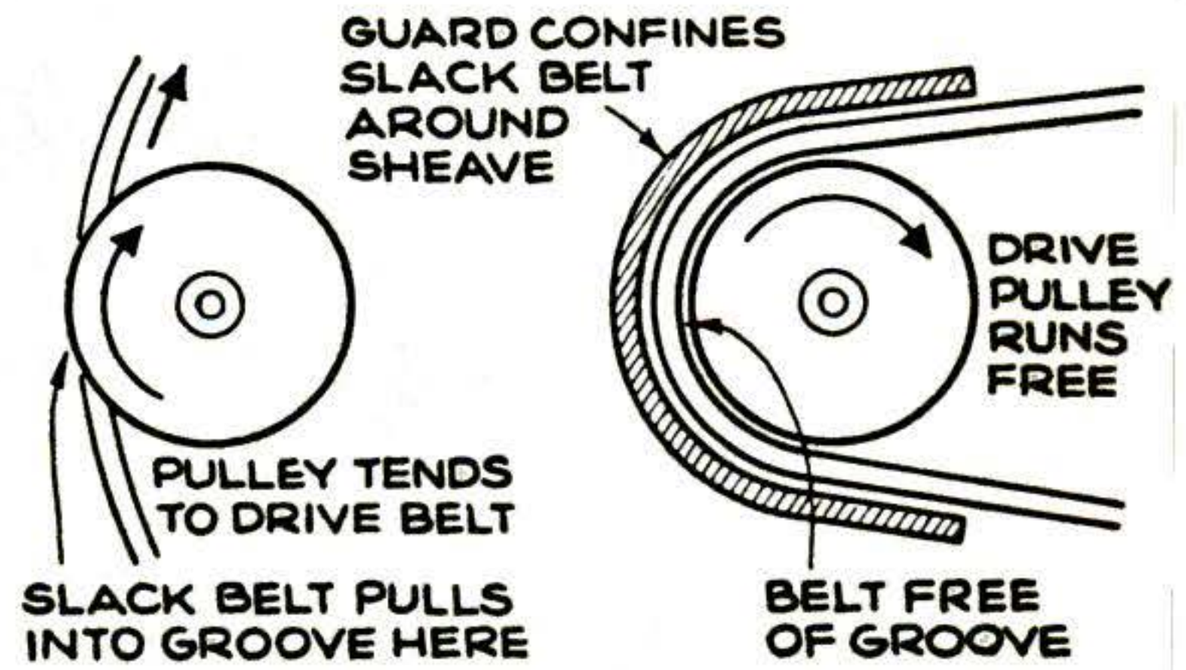



**MISALIGNMENT OF SHAFTS,** as in the top two drawings above, or offset pulleys (third drawing) lead to rapid wear of V belts, even if they run without jumping their pulley grooves.

## Tips on using idlers




**OUTSIDE IDLERS** overstress belts; inside ones lessen the arc of contact and cause loss of power. If an idler is indispensable, use one of the same size as the drive pulley if possible, and mount it inside the slack side of the belt, nearer the larger pulley, as above. If a loose-belt clutch drags, it can sometimes be corrected with a guard on the drive sheave as shown below.




motor running a fan. Gas engines, with their pulsating power, are rougher on belts. Experts suggest "de-rating" their drives by an overload factor of 1.4. That means, with a 1½-hp. gas engine, your drive should have a capacity of 1.4 times 1½, or 2.1 hp.

The same holds for operating a "lumpy" machine such as a piston compressor, which also demands a 1.4 overload factor. Generators and centrifugal compressors call for an overload rating of only 1.2. So do hot or dusty operating conditions, high-starting-torque motors, and frequent starts and stops.

When both the power source and the driven unit call for de-rating, add the overload decimal of one to the other. Thus a gas engine (1.4) driving a piston compressor (1.4) calls for a drive 1.8 times as heavy as the nominal horsepower of the engine.

***Avoid idlers.*** If possible, use a centrifugal clutch instead, or loosen and tighten the belt by pulling back either the driving or driven unit. Normal running tension in other cases should be provided by right belt length and take-up adjustment, rather than by idlers.

If you must use an idler, put it inside the belt, on its slack side, and near the larger pulley. So placed, its tendency to reduce the arc of belt contact will have less effect.

Idlers outside the belt force it into a reverse curve, shortening belt life. If you must mount one there, use a flat instead of a V pulley, at least 1½ times the minimum size shown for normal ones.

***The right tension.*** Belt-tightening clutches sometimes drag even in the disengaged position, for the V belt's natural shape and resiliency tend to pull it into the far side of the driving sheave. This can be prevented with a close-fitting belt guard around the driving pulley. By constraining the tangent belt sections near the sheave, it prevents the far side from drawing in, as shown in a drawing.

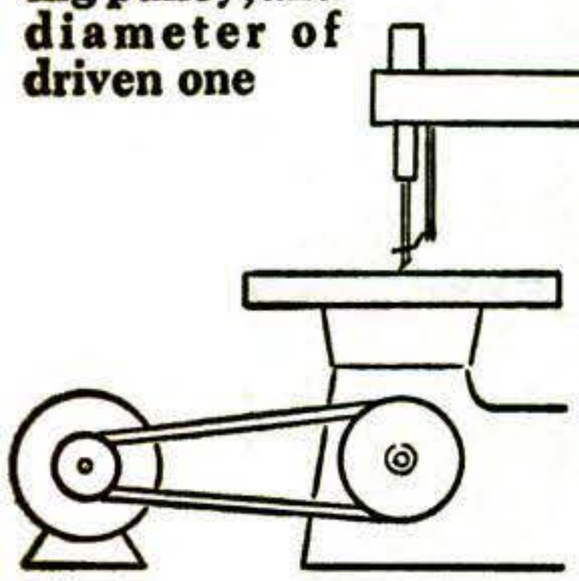
V belts are meant to run tight. Slack-

CONTINUED

Copyrighted material

## Easy Ways to Calculate Pulley Sizes and Shaft Speeds

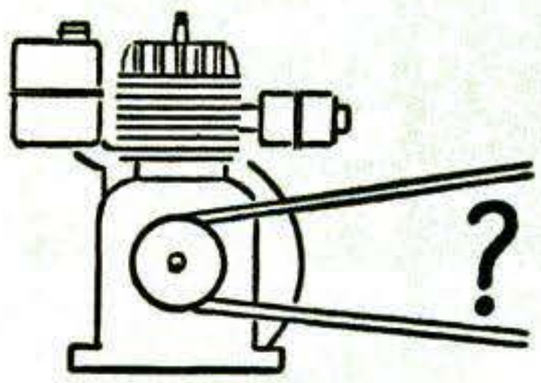
| IF YOU KNOW | AND WANT | DO THIS |
|---|---|---|
| Speed and diameter of driving pulley, and diameter of driven one | Speed of driven pulley | Multiply speed of driver by its diameter; divide by diameter of driven pulley |



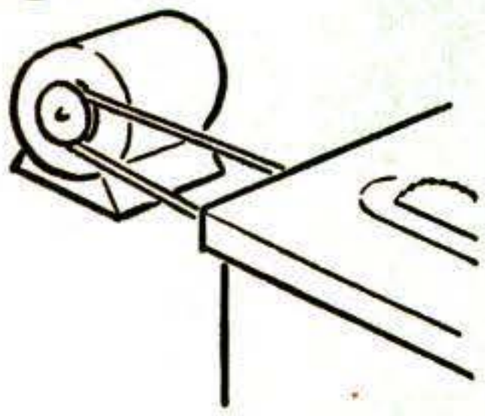
**EXAMPLE:** A 2" motor pulley turns at 1,750 r.p.m. to drive a 3½" pulley on a jigsaw. How many strokes a minute will result? Multiply 1,750 by 2; divide by 3½. Answer: 1,000.

| IF YOU KNOW | AND WANT | DO THIS |
|---|---|---|
| Speed and diameter of driving pulley and required speed of driven one | Diameter of driven pulley | Multiply speed of driver by its diameter; divide by required driven speed |

**EXAMPLE:** A countershaft is to turn at 1,650 r.p.m. when driven from a 3" pulley on a gas engine governor-controlled at 2,200 r.p.m. What size pulley is needed on the countershaft? Multiply 2,200 by 3; divide by 1,650. Answer: 4".



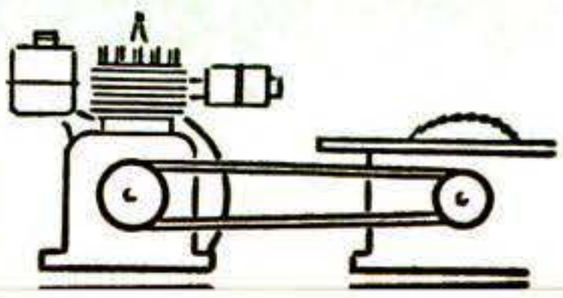

| IF YOU KNOW | AND WANT | DO THIS |
|---|---|---|
| Required speed and diameter of driven pulley, and speed of driving shaft | Diameter of driving pulley | Multiply required speed of driven pulley by its diameter; divide by speed of driving shaft |



**EXAMPLE:** A cut-off wheel to run at 4,000 r.p.m. has a 1¾" sheave on its arbor. What size driving pulley is needed on a 1,750-r.p.m. motor? Multiply 4,000 by 1¾; divide by 1,750. Ans.: 4".

| IF YOU KNOW | AND WANT | DO THIS |
|---|---|---|
| Diameters of both pulleys and required speed of driven shaft | Speed of driving shaft | Multiply diameter of driven pulley by the required speed; divide by diameter of driving pulley |

**EXAMPLE:** A gas engine with a 3" pulley is to drive a circular saw at 3,600 r.p.m. The saw shaft has a 2½" pulley. At what speed must the engine run? Multiply



ness causes slippage. This overheats the belt and deteriorates it.

There's an easy test. Pinched midway between pulleys with two fingers, a properly tensioned belt can be twisted no more than half a turn. A more exact way to check tension is to take a tachometer reading of both shafts. The driven one should read within a percent or two of the speed of the driving shaft. Any greater difference indicates excessive slippage.

***Trouble-shooting V drives.*** Never apply belt dressing to cure slippage. Oil is fatal to traction, of course. Clean belt and sheaves with a volatile solvent. But if oil has penetrated the fabric, a new belt is needed.

If a belt slips even though well tensioned and clean, inspect the pulley flanges. If they are worn concave inside, no V belt can hold on them. Mount new pulleys. Caked dirt in the grooves, or pitted, rusty groove walls, can wear belts fast. Dress rusty groove faces with abrasive paper held on a flat block.

Rapid side wear and even breakage may result from misalignment of the two shafts. Check with a straightedge laid against one pulley. The pulleys must be both parallel and in alignment with each other.

Rapid wear may occur in the primary belt to a jackshaft driving more than one machine. This drive from the motor to the jackshaft should be rated for the full horsepower of the motor, plus any overload factor due to the nature of the driven machines. A multibelt drive may be necessary at this point even though single belts suffice for each machine takeoff.

Be sure to take up on a new belt shortly after installation, when the initial stretch occurs—and before slippage and overheating damage it.

If a belt runs where it is subject to oil, dirt, and sawdust, consider protecting it with a suitable guard, or using a special belt designed for such operating conditions.

Premature belt failure may be due to a close-fitting guard that prevents ventilation and keeps the belt running hotter than it should.

Promptly replace a V belt that is oil-soaked, has its fabric peeling, or shows separation of its plies.



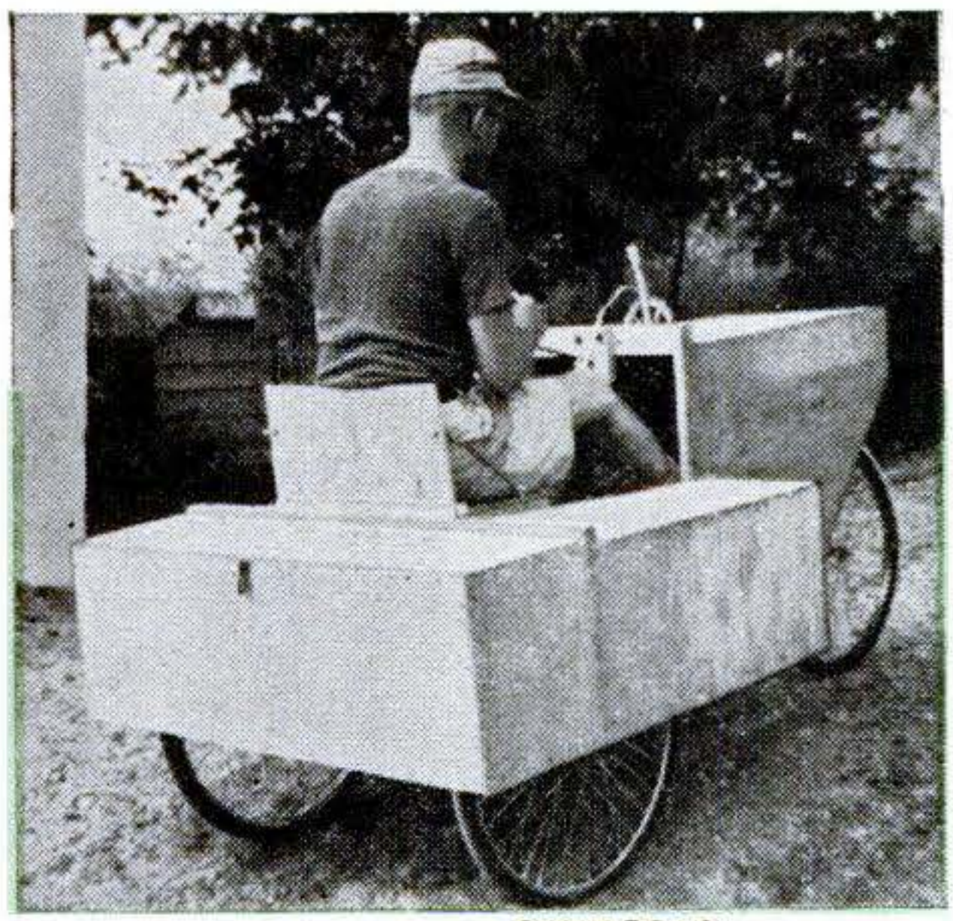
Copyrighted material

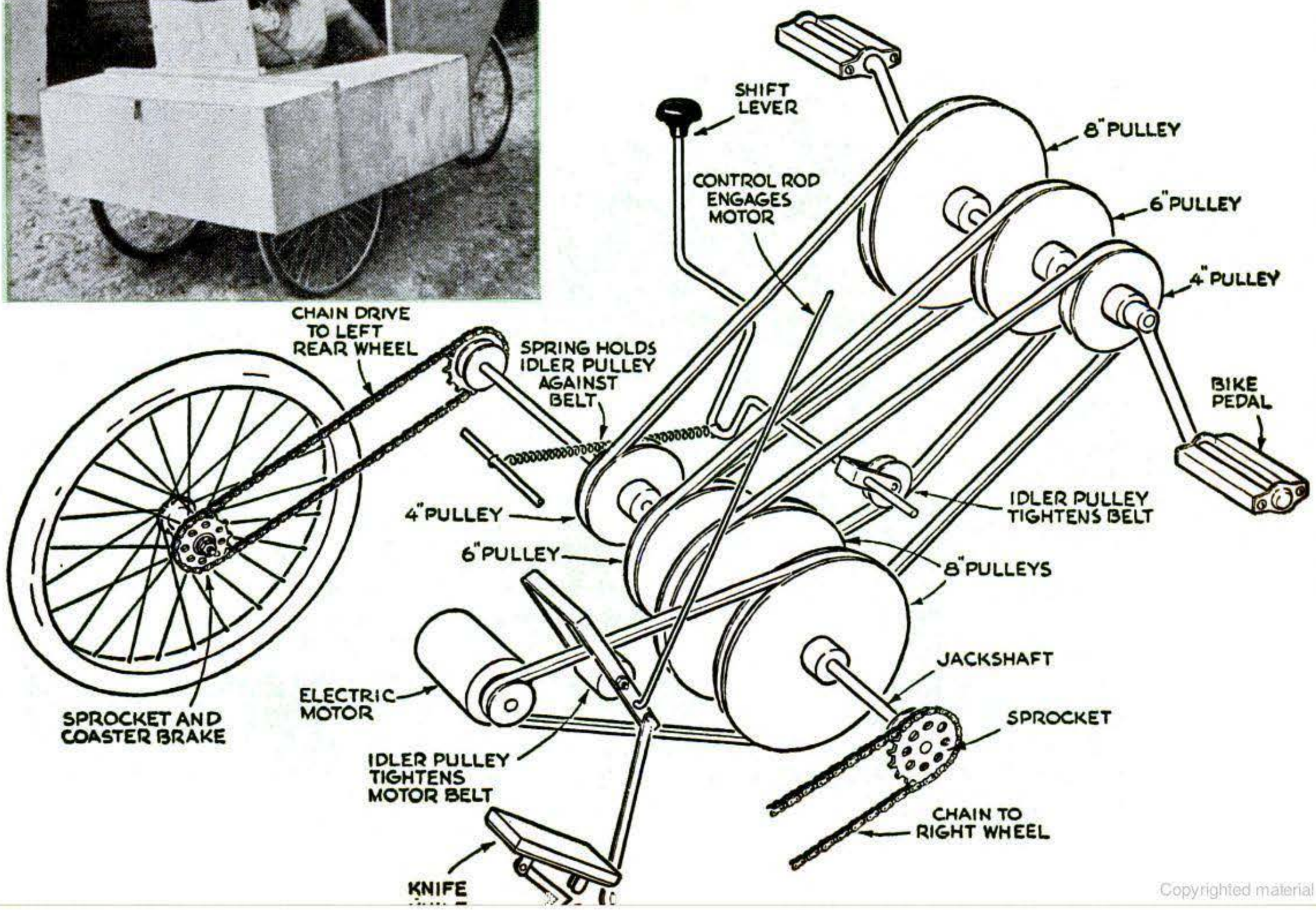
# Motor-Driven Tricycle roams Vermont hills

THERE isn't a hill that this three-wheeled "motortrike" can't climb lickety-split. Made from parts of old bicycles, it has a three-speed transmission that will get you up most grades on pedal power alone. When the going gets really rough, an electric motor cuts in to give you a power assist.

The strange-looking contraption was built to negotiate Vermont's rugged countryside by William R. Kimberly of Middlebury. He now spends much of his time explaining how it works to curious passers-by. Ordinary bicycle pedals drive three sets of belts and pulleys, giving a choice of a 2:1 reduction for steep grades, a 1:1 normal drive, or a 2:1 overdrive for fast travel on level ground. A sliding idler pulley on a gearshift lever tightens the desired drive belt while the other two belts slip.

Twin chains drive both rear wheels through sprockets mounted on the pulley jackshaft. An ingenious differential action is provided by a standard overrunning coaster brake on each wheel. When electric power is wanted, a second idler pulley tightens a belt from the motor to the jackshaft, at the same time closing a knife switch that turns on the current. The motor is from an old auto starter and runs on a periodically recharged car battery.

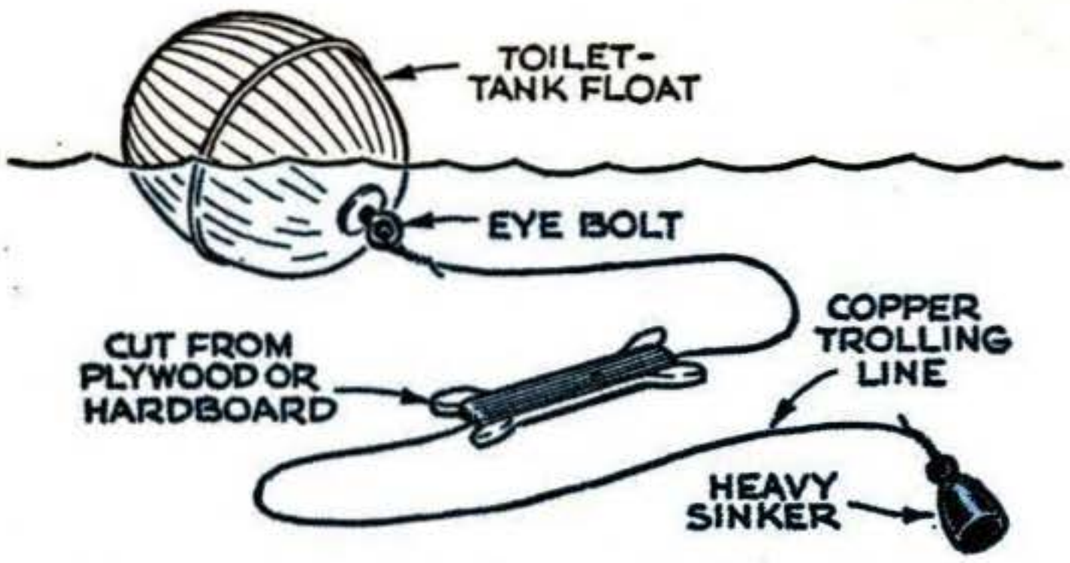




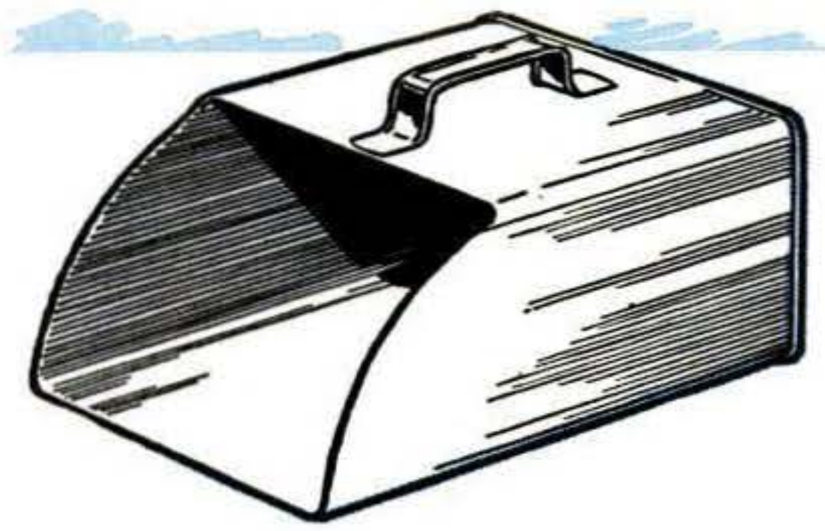

Copyrighted material

# 9 Hints for Better Boating

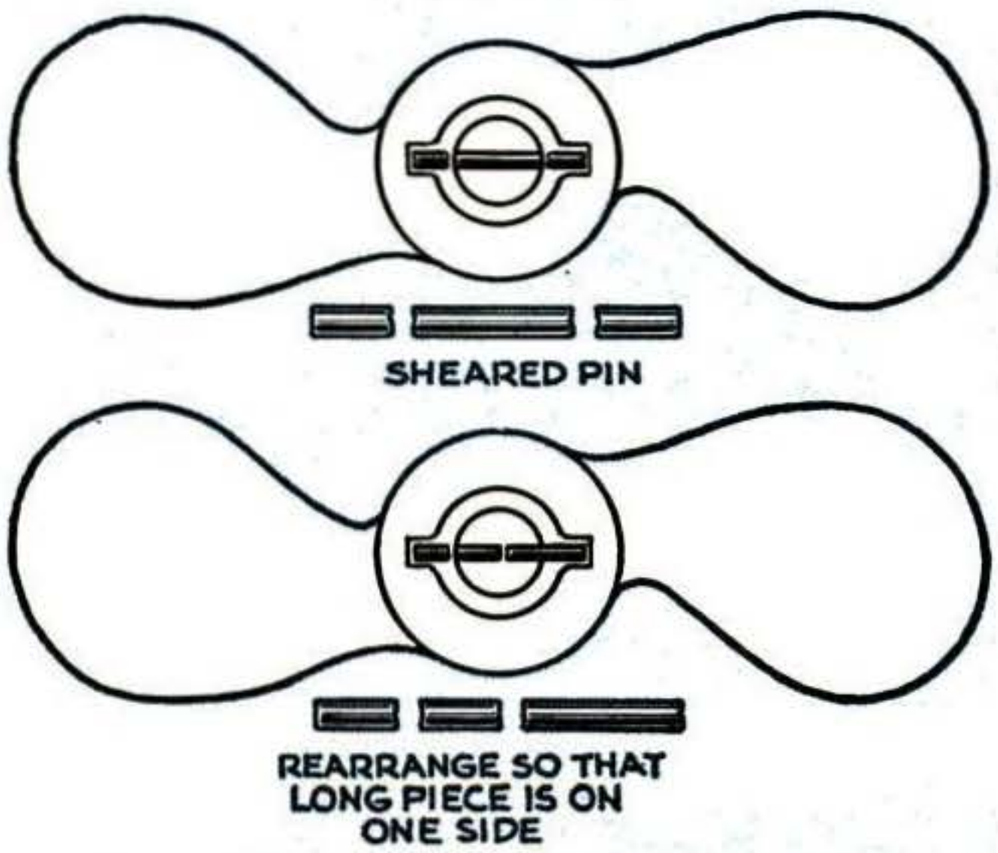
**A windshield that's too low** to afford adequate headroom for a canvas boat top can be extended as you see in the photo and sketches above. Use aluminum tubing to make a new front support at the windshield 1″ higher than the boat top's regular rear support. A sheet of thin clear plastic fills the space between the




**Carry an emergency buoy** to mark your position in case equipment is lost overboard or to mark good fishing grounds. A toilet-tank float makes an ideal buoy. Fit it with an eye bolt in place of the float arm and tie on a long line with a heavy fishing sinker at the end.—*Victor H. Lamoy, Upper Jay, New York.*



**You can bail faster** with a large, flat-sided scoop like this. Cut the end from an eight-quart oilcan, leaving a sloped-sided opening as shown. Unsolder the handle from the top and resolder it to the side. If you paint the bailer to match the color of the boat's interior, it will be less conspicuous and won't rust.

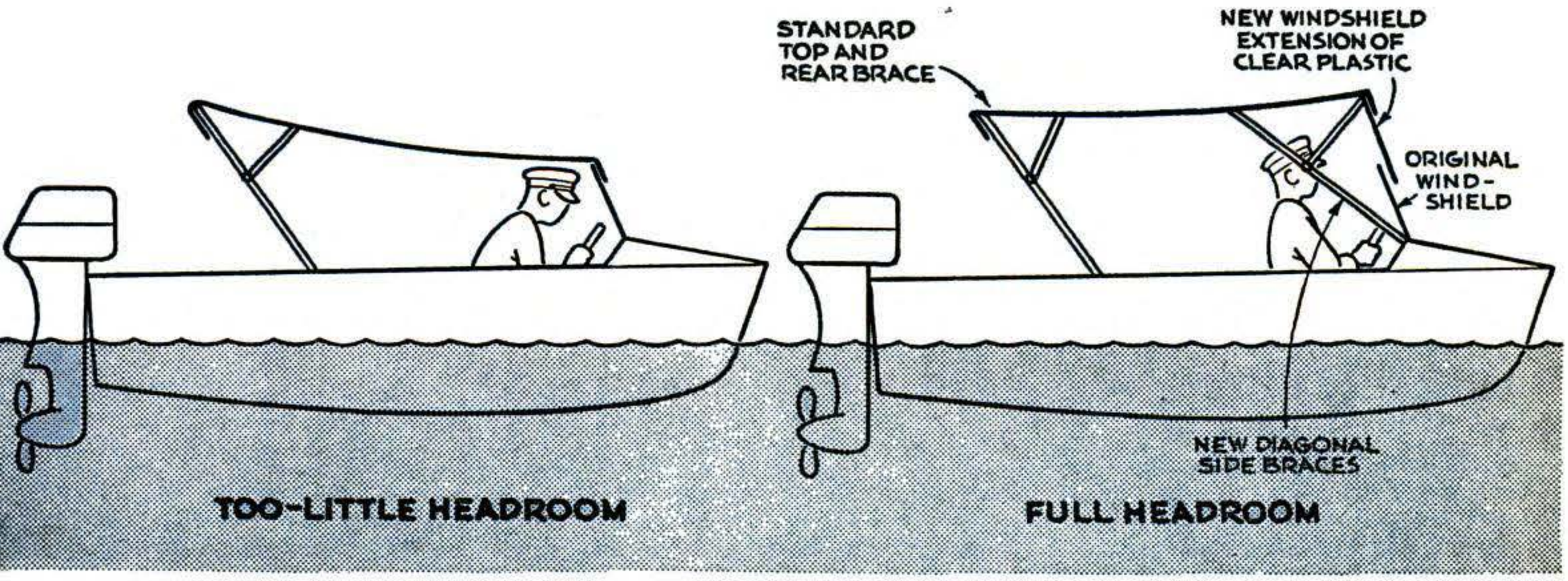



**If you break a shear pin** and have no spares, this trick will get you back to port. The pin usually breaks into two short pieces at the ends and one longer length in the middle (top left). Rearrange the pieces so the long one is to one side (lower left) and replace the prop. The long part of the pin will engage the hub for an emergency trip home. —*D. N. Kofoid, Novato, Calif.*

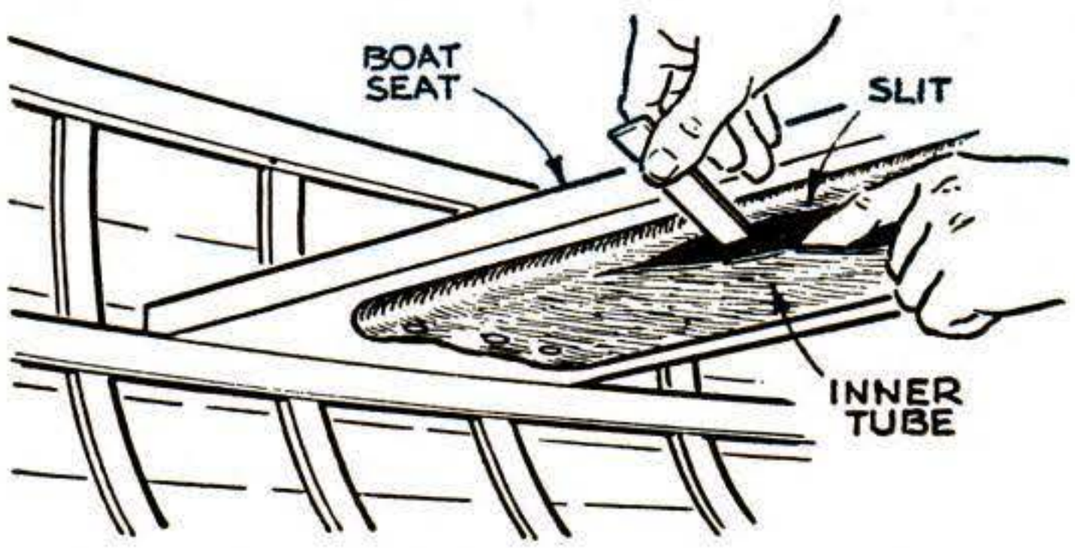
▶▶▶**Inexpensive grab rails** can be added to a deck or cabin by using chrome towel bars. The bars are attractive and can be bought in any length up to several feet.—*Donald E. Henry, Oquawka, Ill.*



Copyrighted material

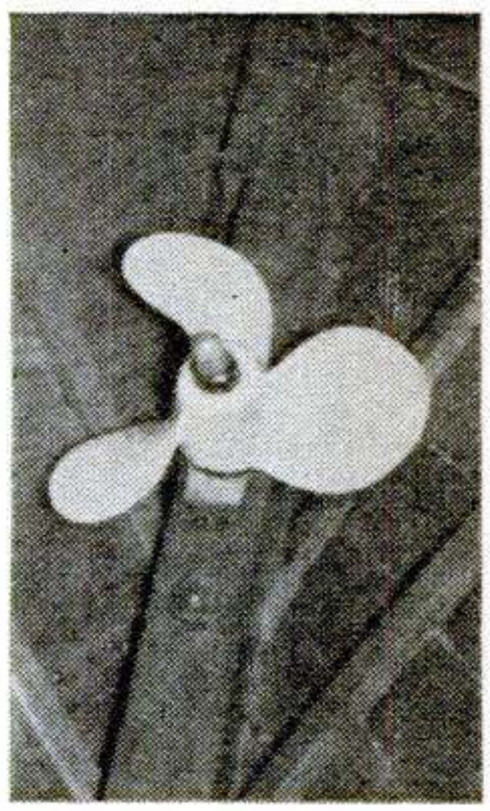


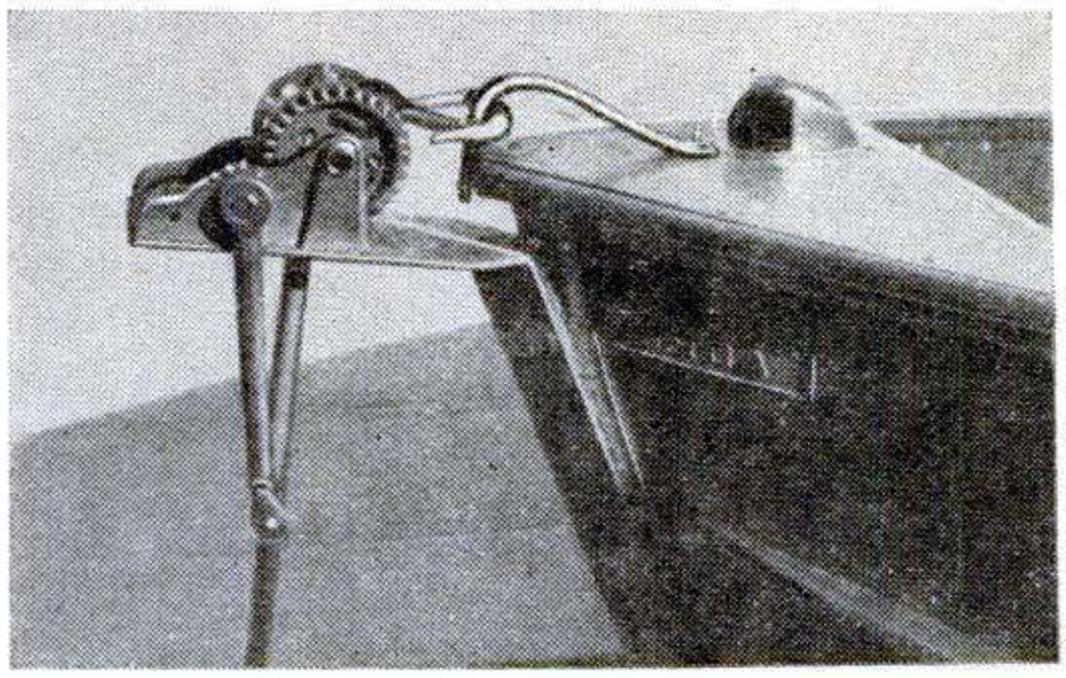

raised top and the original windshield. The plastic can be held in place by snap fasteners mounted on the windshield and along the upper and lower edges of the plastic. You can make new side curtains out of plastic and canvas to the required height to fit between the top and the deck.—*Lee H. Schrimpf, Tulsa, Okla.*



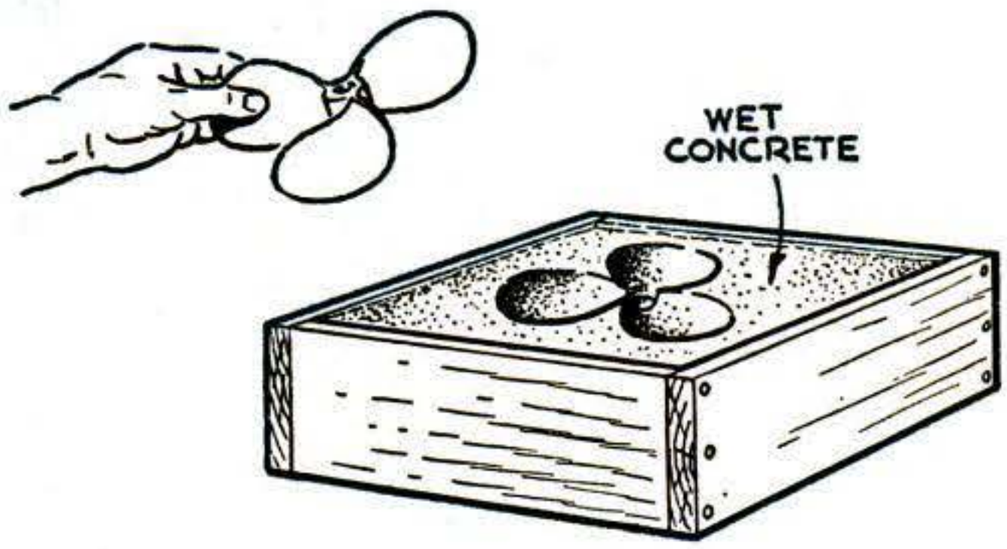

**Stow small gear** in a section of inner tube tacked by its ends beneath one of the boat seats. For the opening, cut a slit several inches long in one side.

**A spare propeller** can be safely stored in the unused bow space this way. A scrap dowel in a wood block screwed to the stem makes a handy peg to pin it on. The prop's cotter pin through the dowel locks the hub in place, and a rubber crutch tip snugs it against rattles.





**A boat-trailer winch** requires less muscle when it's level with, or slightly higher than, the spot on the bow where you attach the line. A winch below this level causes the line to pull bow against trailer, increasing friction as the boat moves ahead. If the winch is higher, the line lifts the bow, lightening drag.




**A bent propeller** can be restored to original shape if you take its impression when new. Press the prop into a shallow box filled with stiff mortar and remove it immediately. Damaged blades can then be placed in the hardened mold and gently worked back to shape with a mallet.—*Ken Murray, Colon, Mich.*



Copyrighted material

# I Fish in My Back Yard

**By Hi Sibley**

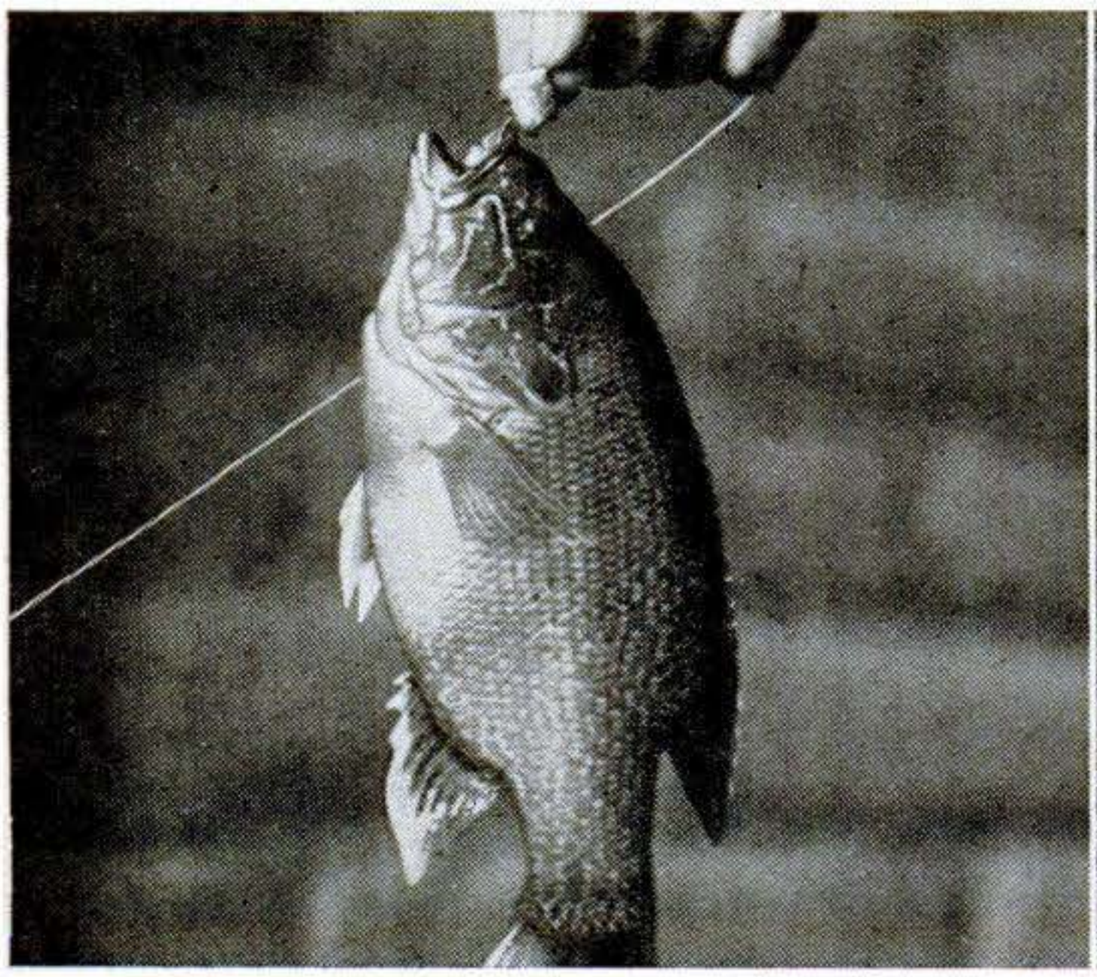
No long fishing trips for me—I just walk out the back door.

I STEP right out my back door into a fisherman's paradise. It's a small, home-built water hole so overflowing with mouth-watering bluegills that I can take out as many as 30 to 40 at a time.

A home fish pond is easy to build because it needn't be fancy—fish aren't fussy. Soon you have hours of relaxing fun as well as fresh, golden panfish such as you've never tasted before.

My pond is simply a shallow, irregular saucer scooped out by a tractor with a blade. No bulldozer is necessary. The sides are lined with a 1-2-3 mix of concrete. A bed of sand or gravel and steel reinforcing mesh are advisable in frost areas. A drainpipe allows water to be drawn off and replaced to keep the pond fresh. A tub of water lillies provides cool shade for the fish on hot days.

To stock the pond, fingerlings can be obtained inexpensively at any state hatchery. I bought bluegills because they multiply like crazy. In a small pond, some extra food is required to supplement the natural supply—about a pound of chopped liver a week. The fish love it. U. S. Department of Agriculture Bulletin No. 1983 gives valuable information on raising fish in home ponds.



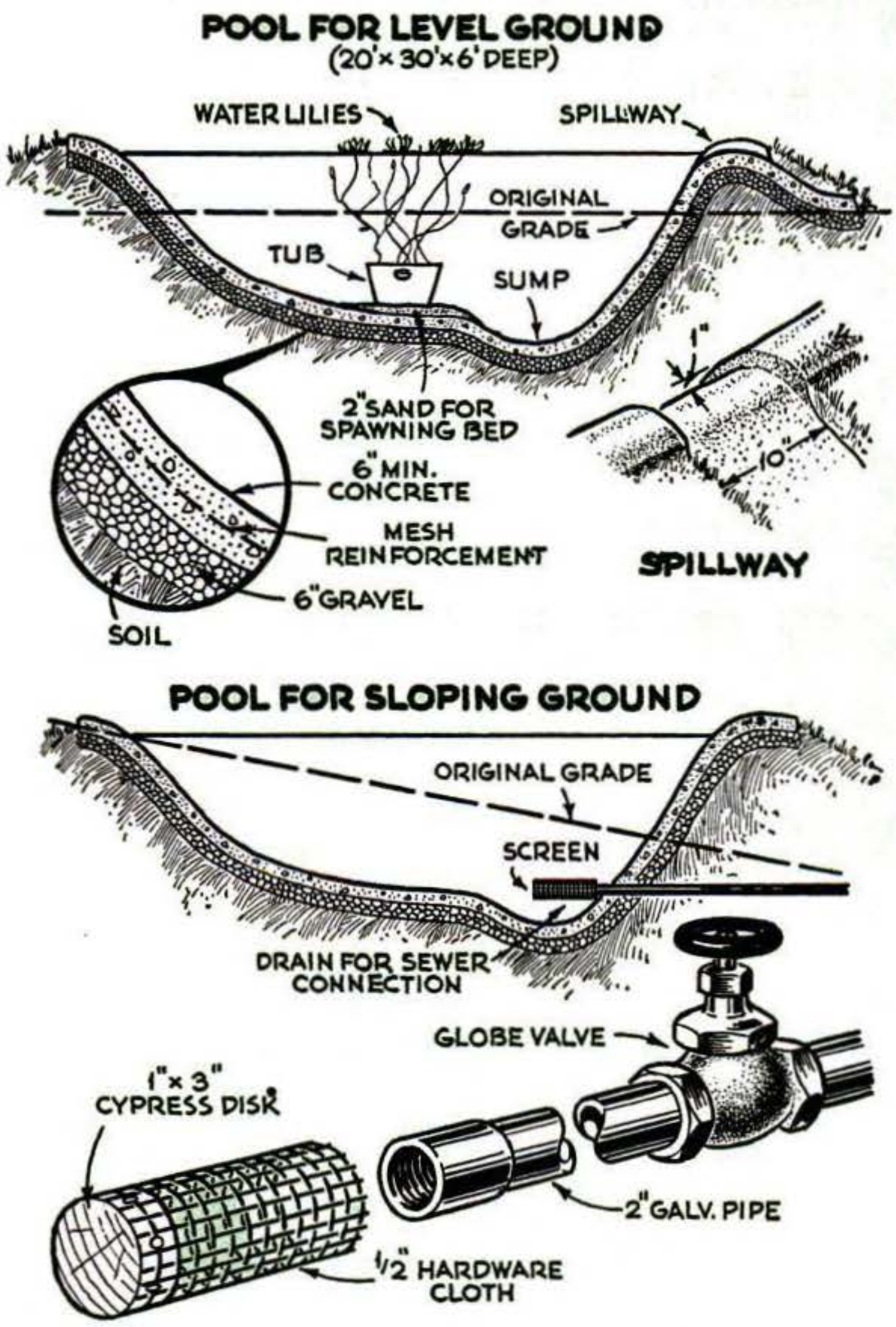
**TWO-YEAR-OLD BLUEGILL** is one of many good-size fish that can be raised in a home pond.

**A TRUE FISH STORY:** These 17 bluegills were all caught in one hour in the author's pond.

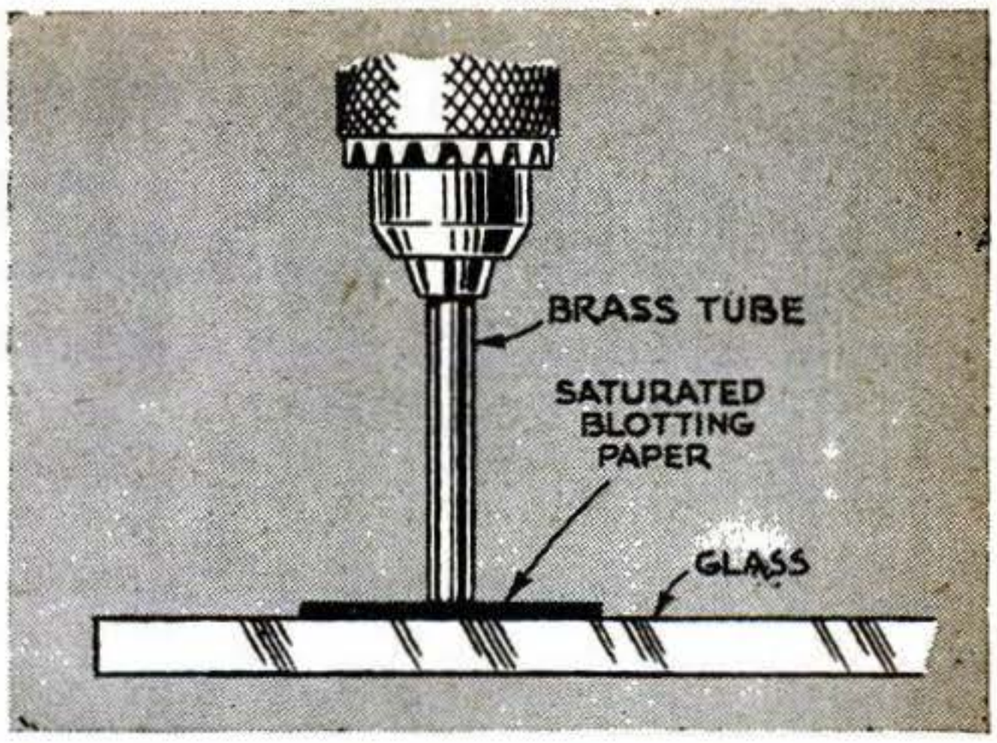


Copyrighted material

This is the life—how lazy can you get?

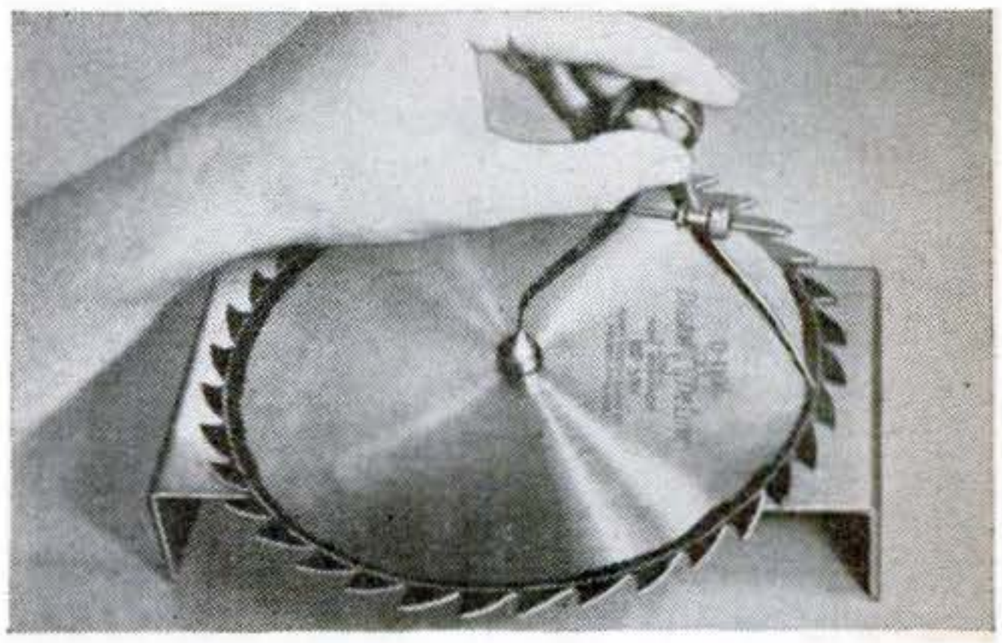



**A SAUCER-SHAPED FISH POND** can be put on either a level or sloping lot, as shown above.




## Keeping a Glass Drill Moist

HERE'S a neat way to drill glass without the mess of building up a putty dam to hold the lubricant and abrasive. Lay a blotter over the spot to be drilled; keep it saturated with lubricant.—*W. C. Wilhite, Carlinville, Ill.*

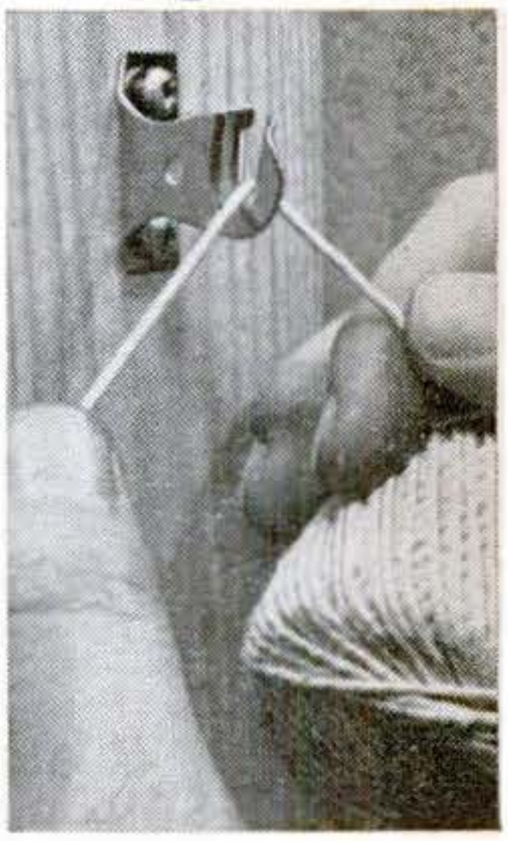


## Filing Saw Teeth Accurately

FILING the gullets of a circular-saw blade by eye is tough. Using dividers with a steel ball soldered to one leg to fit the blade hole, you can scribe a circle concentric with the teeth to give an accurate guide. For better visibility, use layout ink on the blade edge. —*Robert Micals, Freehold, N. J.*

## Wall-Mounted String Cutter

A WINDOW-SHADE holder makes a handy string cutter to mount on the wall of your shop. Just file a sharp edge at the bottom of the slotted opening. Hooking the string into the slot severs it neatly.—*Wayne Floyd, Fayetteville, Tenn.*





Copyrighted material

# My Amazing Lean-To Scaffold

**By E. M. Harman**

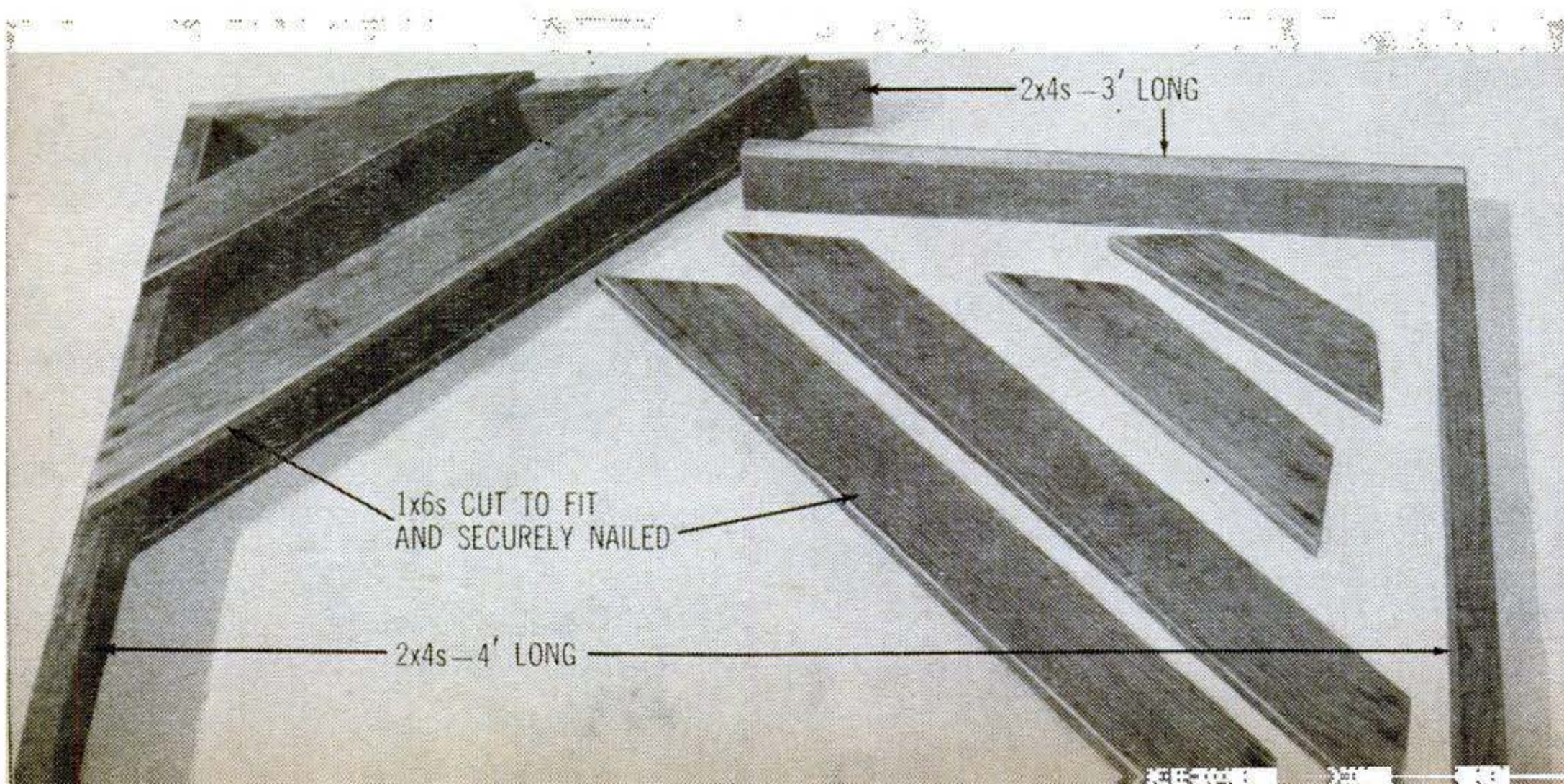
THIS lean-to scaffold is the result of a long process of elimination. When I started building our cabin in the mountains, I didn't know a floor joist from a window header. The framing was all precut, though, so I made out all right until time came to put on the knotty-pine siding. The cabin has two stories and is on a lot that slopes sharply front to back and side to side. The peak of one gable is 30 feet from the ground.

I started building the scaffolding in a haphazard way and by the time I was through it was hard to tell where the cabin left off and the scaffolding began. Worse yet, the scaffolding couldn't be moved, raised, or lowered without completely dismantling it. Trying to simplify it to a point where I could adjust the height and move it as a unit, I began removing a brace here, a board there.

By accident, I discovered that the resulting scaffold didn't have to be nailed to the wall. After using it for several hours where I had first erected it, I started to move it. That's when I found I hadn't put in the temporary nails I had planned to drive through the uprights into the wall. This was something —no nail holes to mar a finished wall.

It's easy for one man to raise and lower this scaffold, as shown in the sketches. I've used it with the legs set at angles from 30 to 60 degrees without trouble, but I think it is wise to keep the angle as near 45 degrees as possible. I use two-by-eights for the platform. Usually I nail them to the brackets at each end—leaving the nailheads protruding for easy pulling. The nails don't seem to be essential, but psychologically I find they're worth the extra effort.

**IT WORKED SO WELL** on my cabin that I made a scaffold to use around home, too. With it, I made short work of painting garage overhang. Photo below shows how brackets are made.




Copyrighted material

NAIL TEMPORARILY IF YOU'RE THE NERVOUS TYPE

WEIGHT ON PLATFORM WEDGES BRACKETS ... TIGHTER AGAINST WALL

USE 2x8s FOR PLATFORM

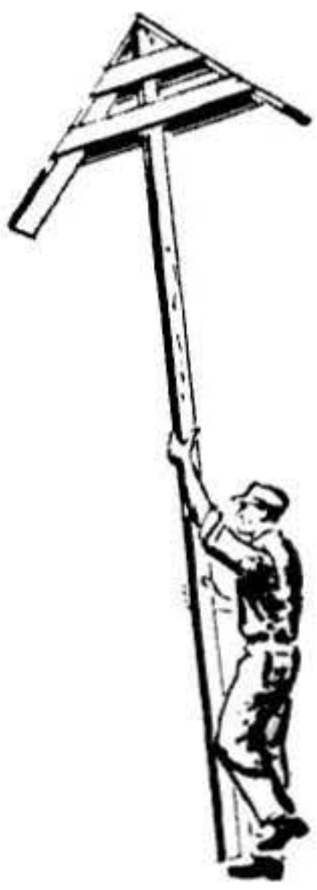
DOWNWARD LOAD IS RESISTED BY DIAGONAL THRUST OF LEGS AGAINST WALL

DON'T STEP BACK TO ADMIRE YOUR WORK

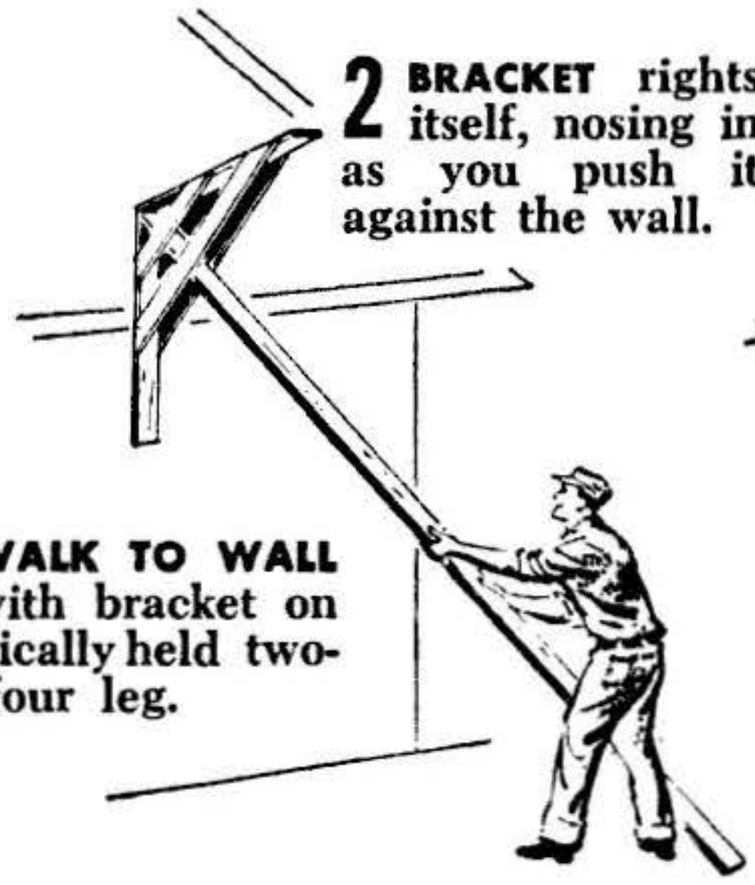
CHOOSE STRAIGHT, SOUND 2x4s

KEEP THIS ANGLE CLOSE TO 45° — NEVER LESS THAN 30° OR MORE THAN 60°

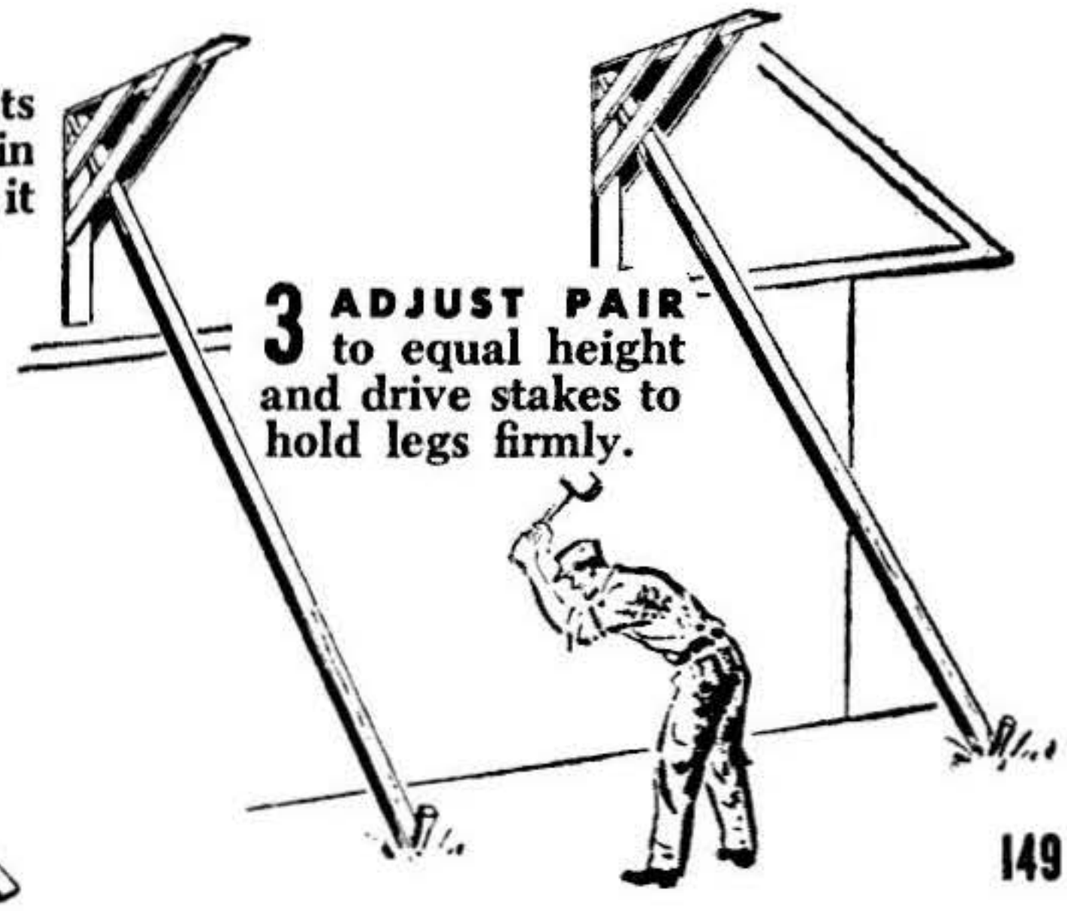
DRIVE STAKES HERE



**1 WALK TO WALL** with bracket on vertically held two-by-four leg.



**2 BRACKET** rights itself, nosing in as you push it against the wall.



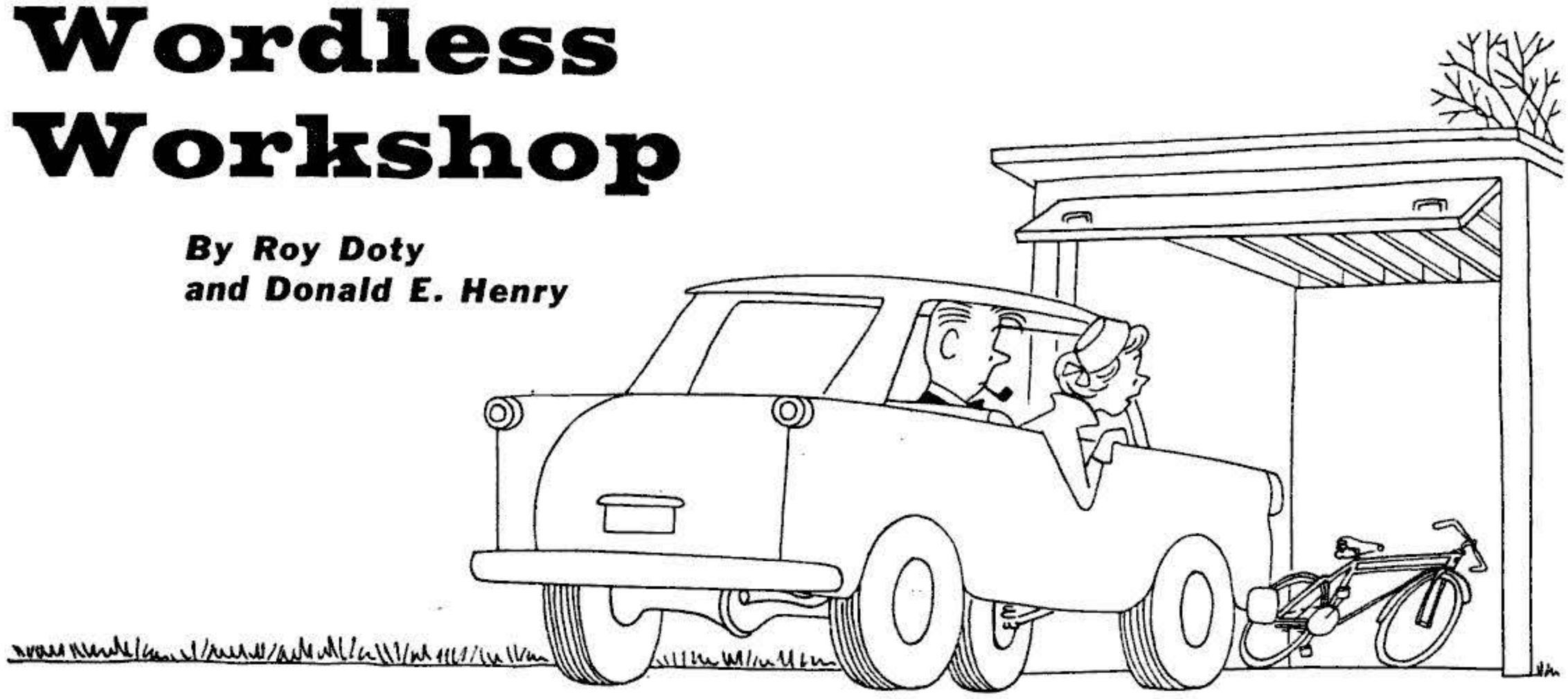
**3 ADJUST PAIR** to equal height and drive stakes to hold legs firmly.

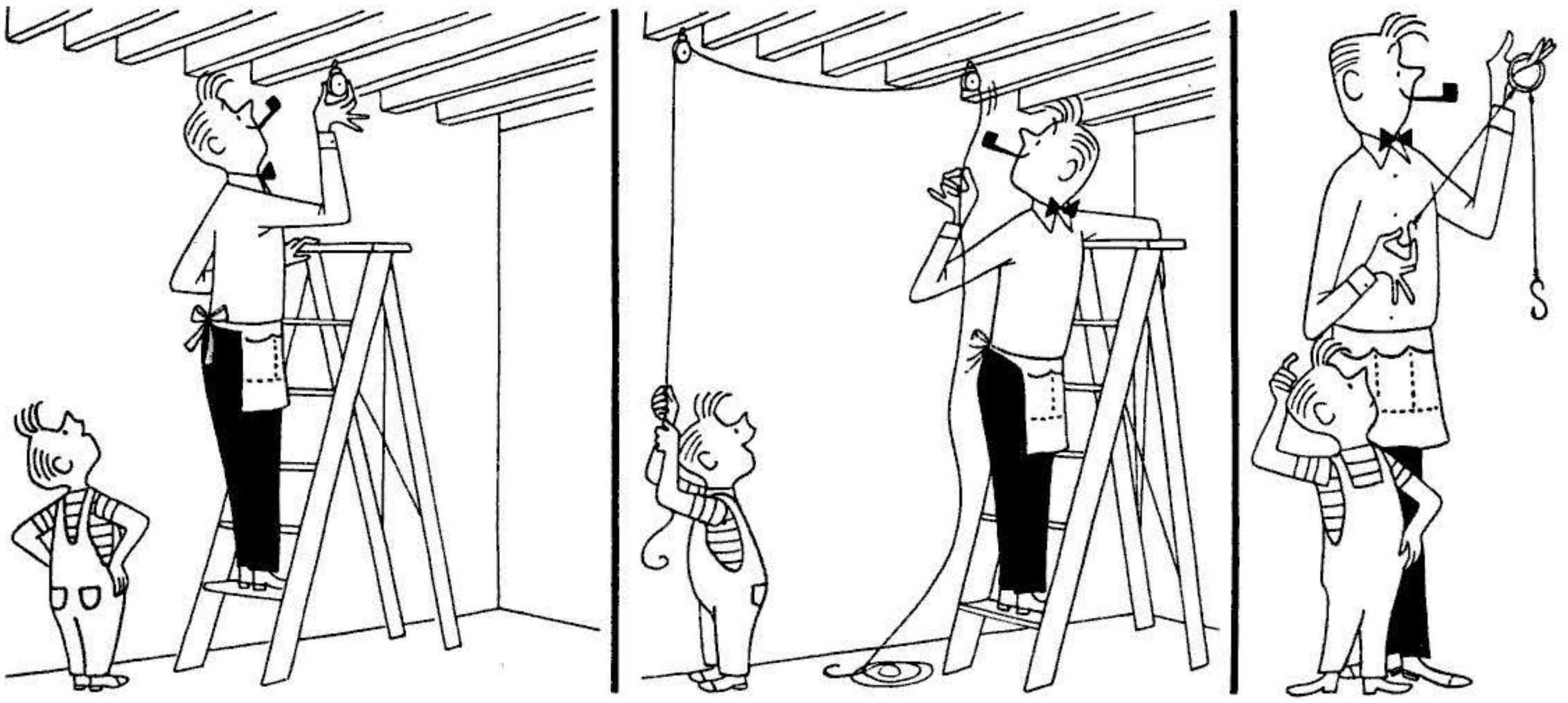


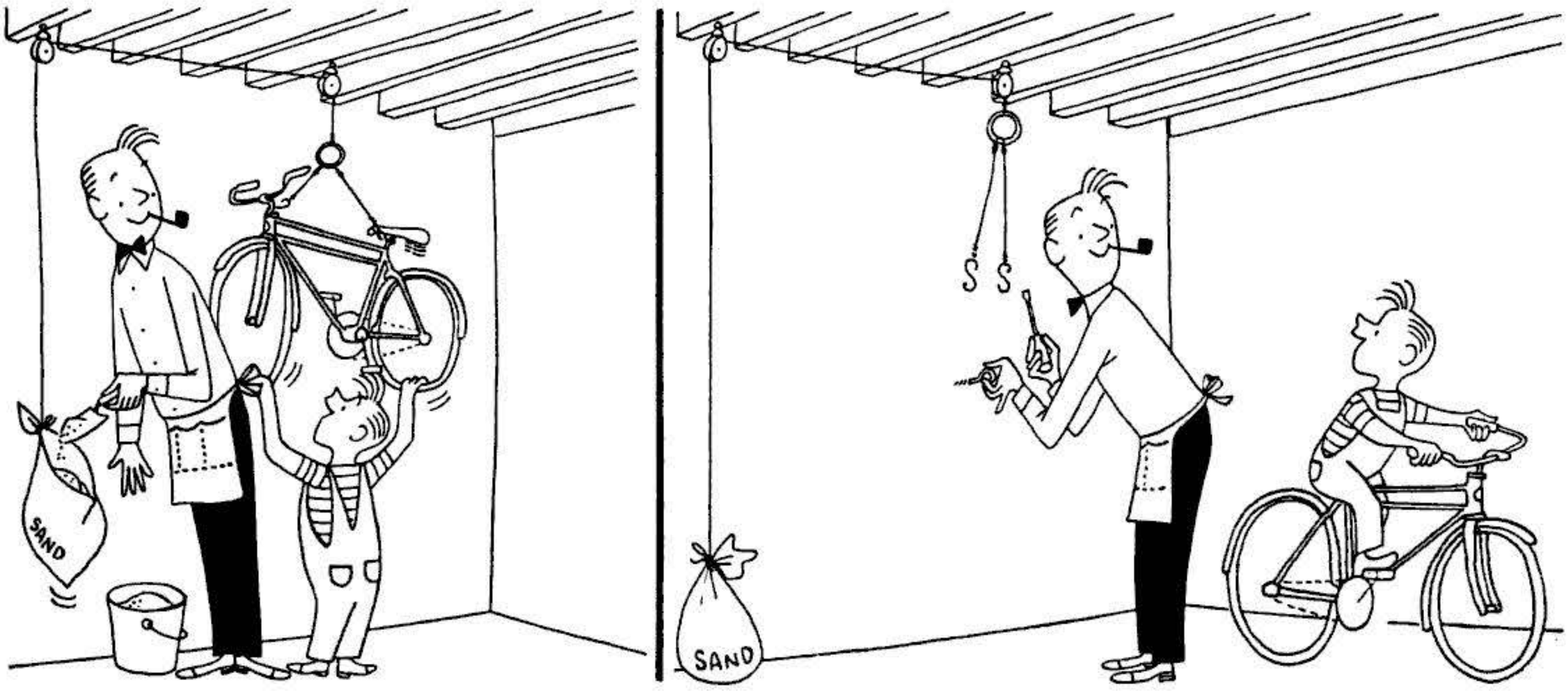
Copyrighted material

# Wordless Workshop

By Roy Doty
and Donald E. Henry

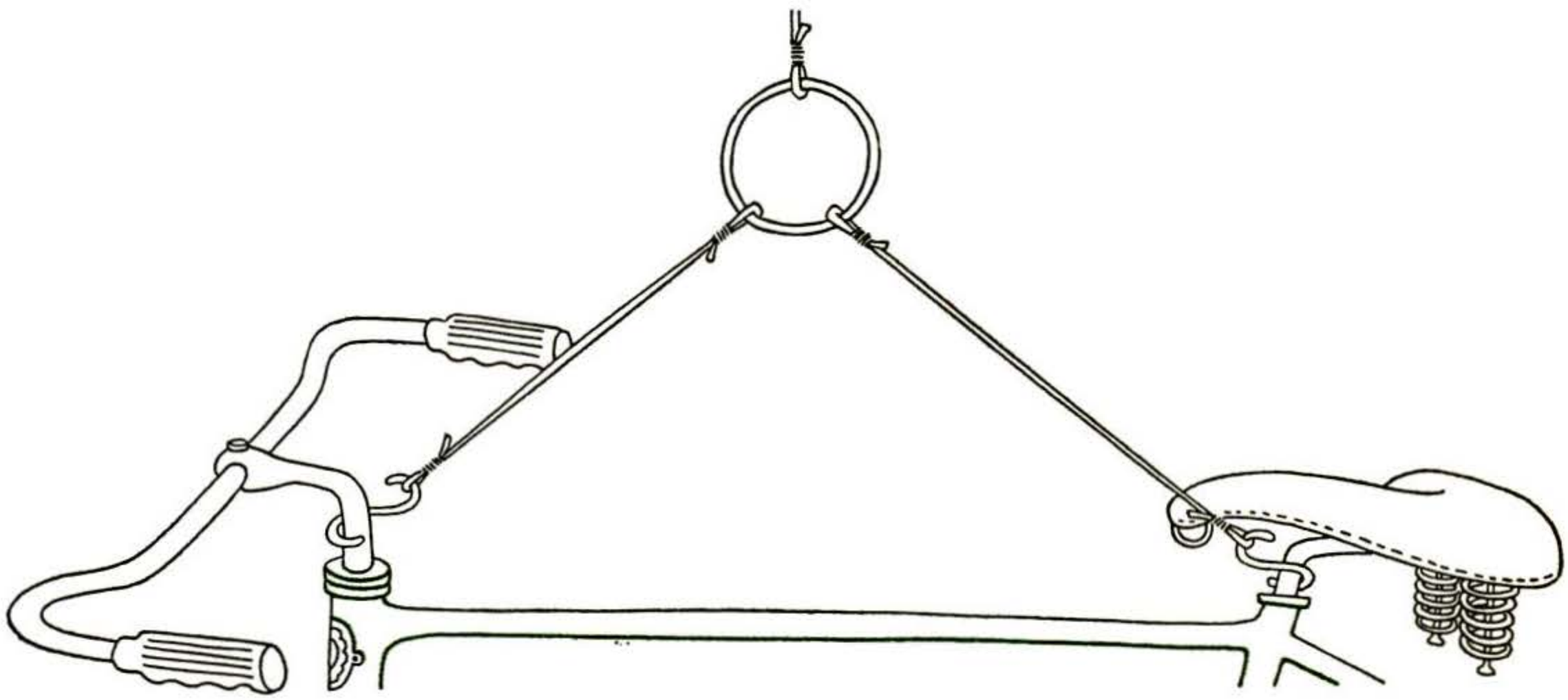


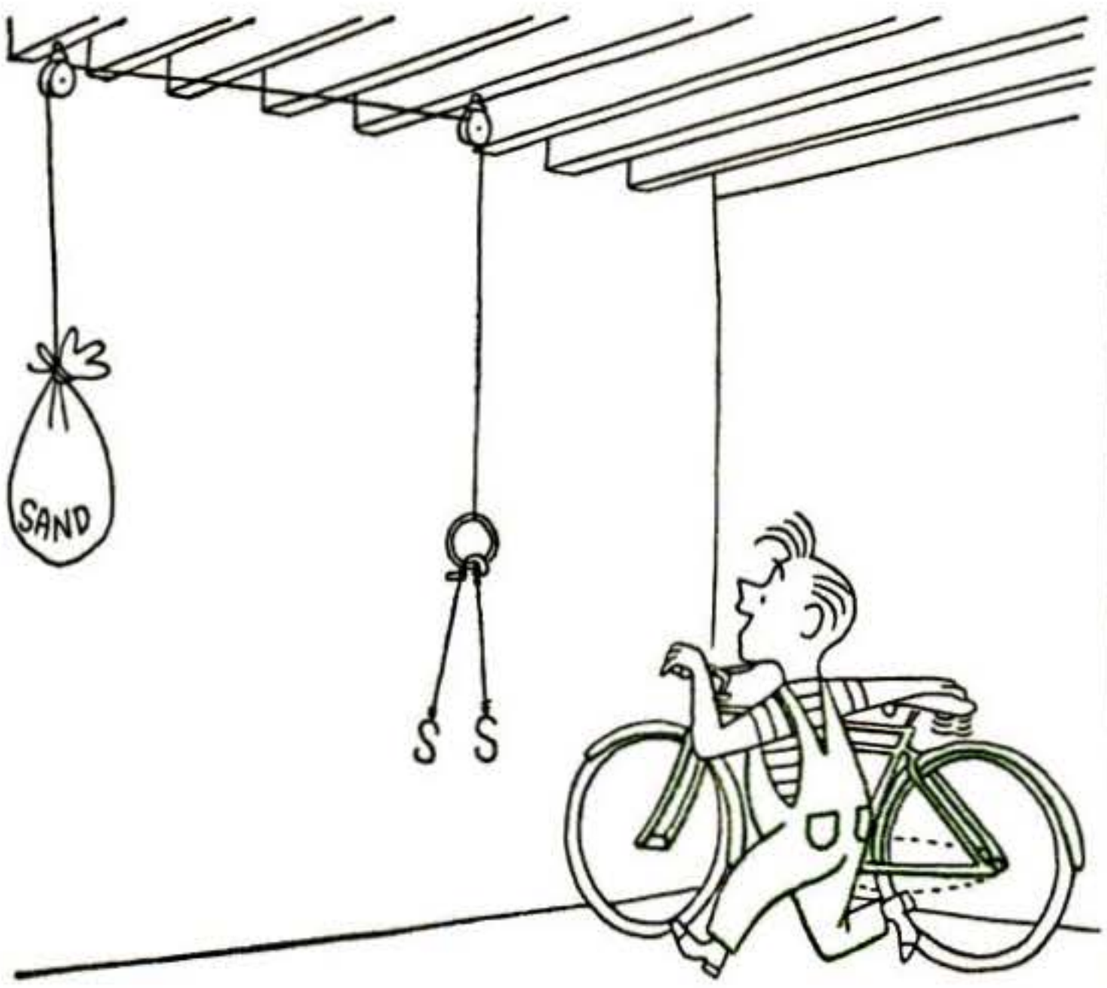


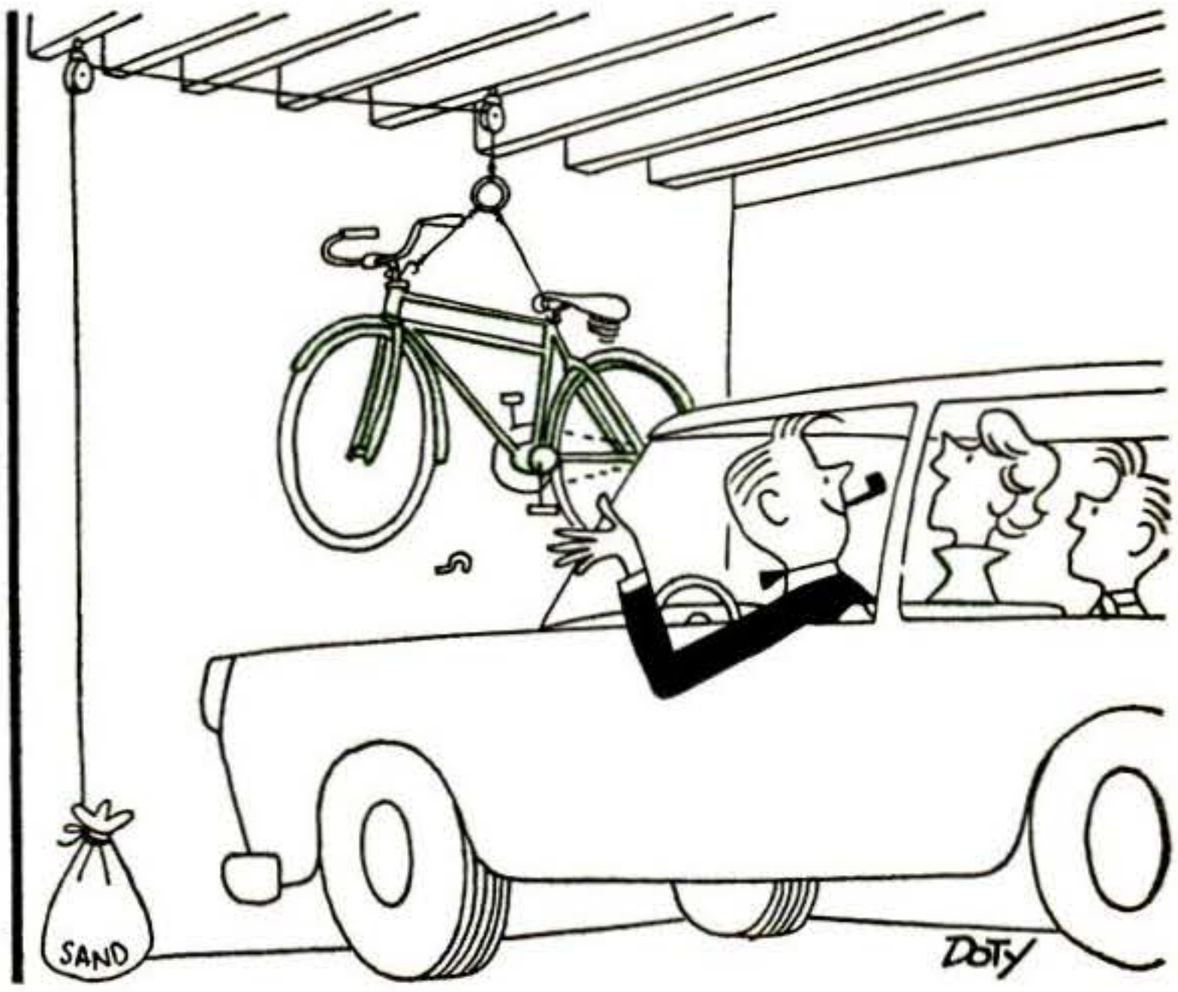






Copyrighted material








Copyrighted materia

# SHOP-USE REPORT on the

# Maximat 10" Precision Lathe

**By Herbert R. Pfister**

MACHINING operations you've only dreamed of tackling on standard lathes are routine with the new Maximat. It's a multipurpose tool designed with a single idea—to cram a maximum of machining ability into a single machine.

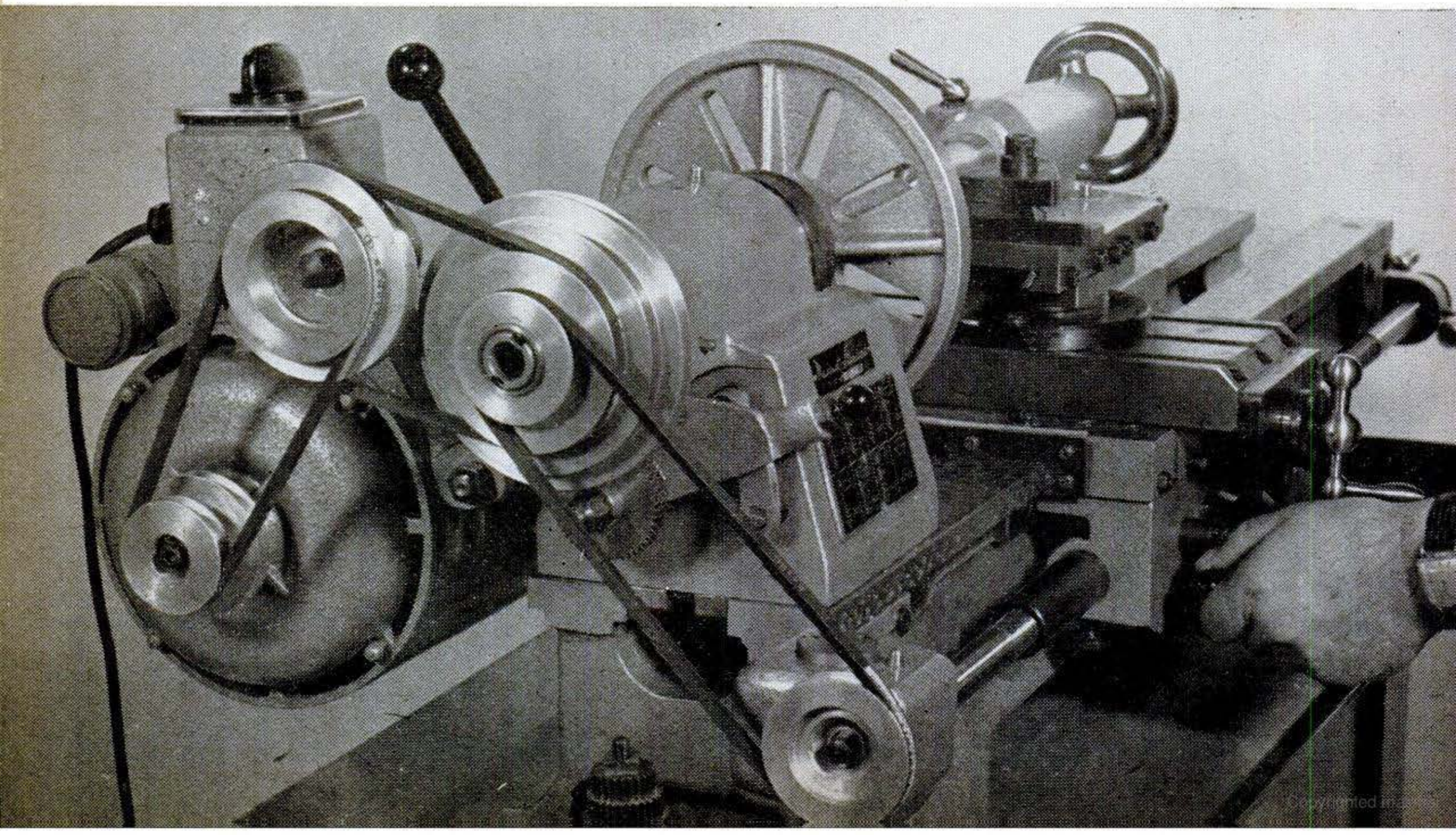
The husky precision lathe can be converted in minutes to a vertical milling machine, jig borer, or drill press to handle almost any job a machinist can demand of it. Made in Austria, it is the big brother to the Unimat, a versatile metalworking tool already familiar to modelmakers and hobbyists in this country.

The workmanship in the tool is excellent, and using it is a delight. Massive parts respond easily to the controls. The tool bit bites with assurance into work chucked in the solidly built headstock—you wonder if you *could* make this machine chatter or squeal. But there are a few disadvantages.

The tool lacks features expected as standard by American machinists. For example, there is no provision for indexing work held in the headstock. The tool post holds the cutter bit level—you can't adjust the angle at which it meets the work. One nuisance: The motor switch must be turned to a start position to energize the motor's starting winding before advancing it to forward or reverse.

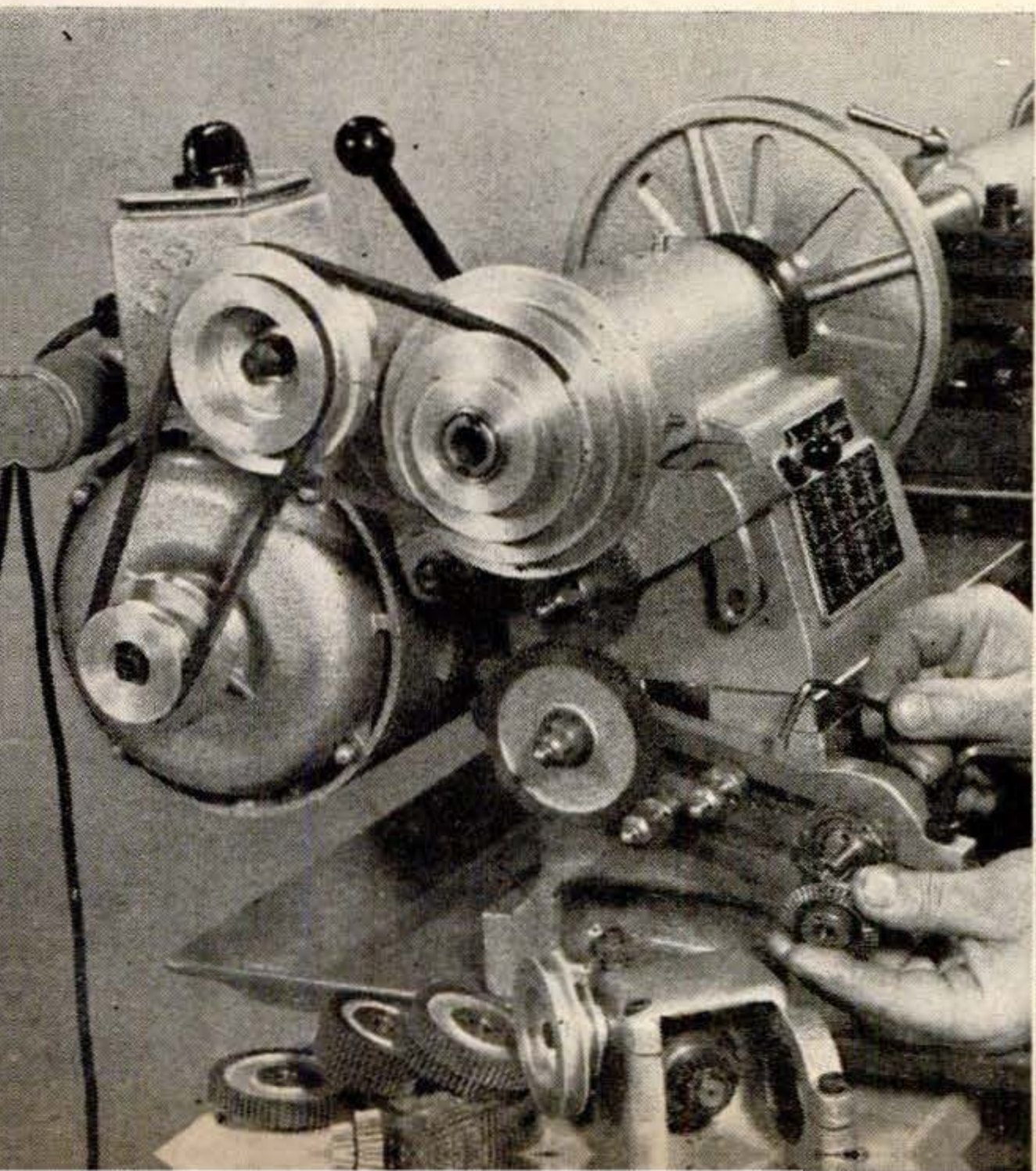
The tool is marketed by American Edelstaal, Inc., 350 Broadway, New York City. The basic machine is priced at $795. Equipping it for multipurpose duty as illustrated can add several hundred dollars to the base price.

**QUIET LEAD-SCREW DRIVE** through V belts permits automatic carriage feed without setting up change gears. A separate motor can be used to drive the lead screw for independent control of carriage feed and spindle speed.

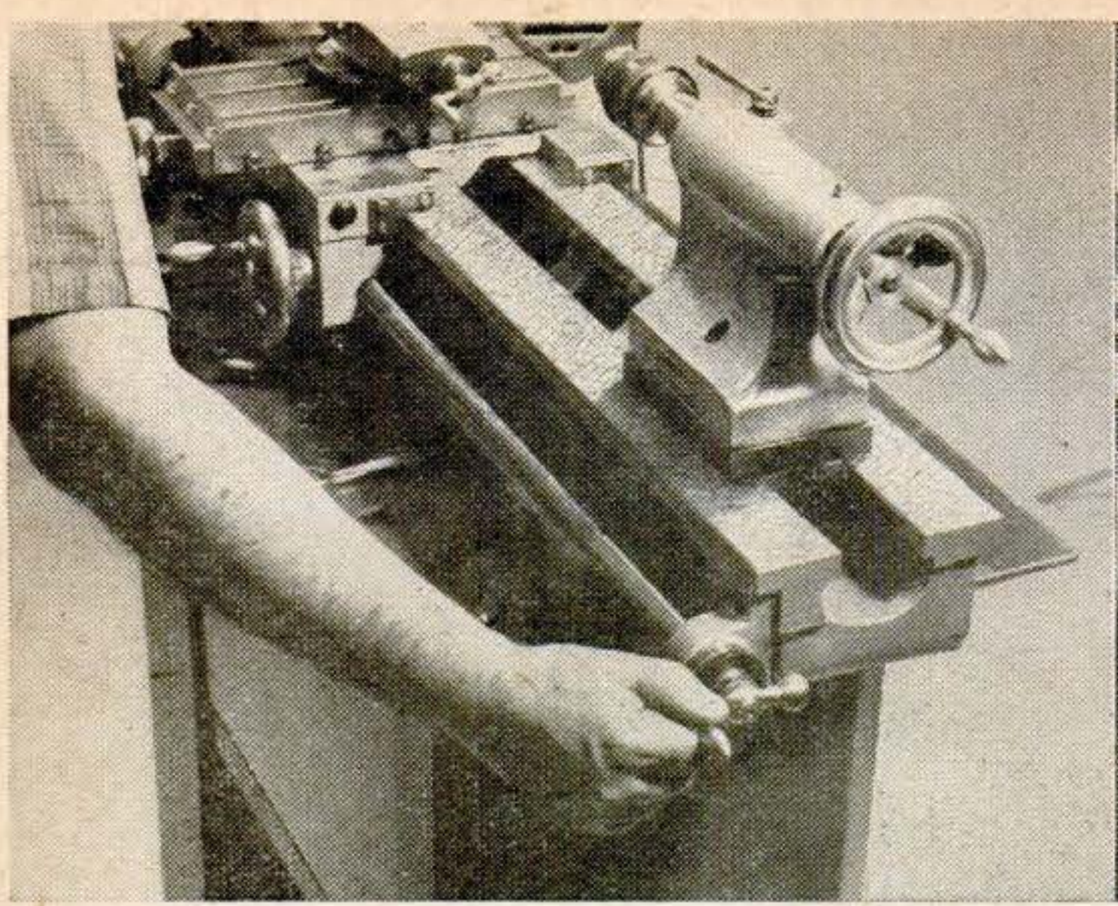


**FOR THREAD CUTTING,** a change-gear carrier is installed in place of the pulley box on the lead screw. Gears are selected and installed on the carrier in the usual way to lead the carriage for the thread pitch desired.

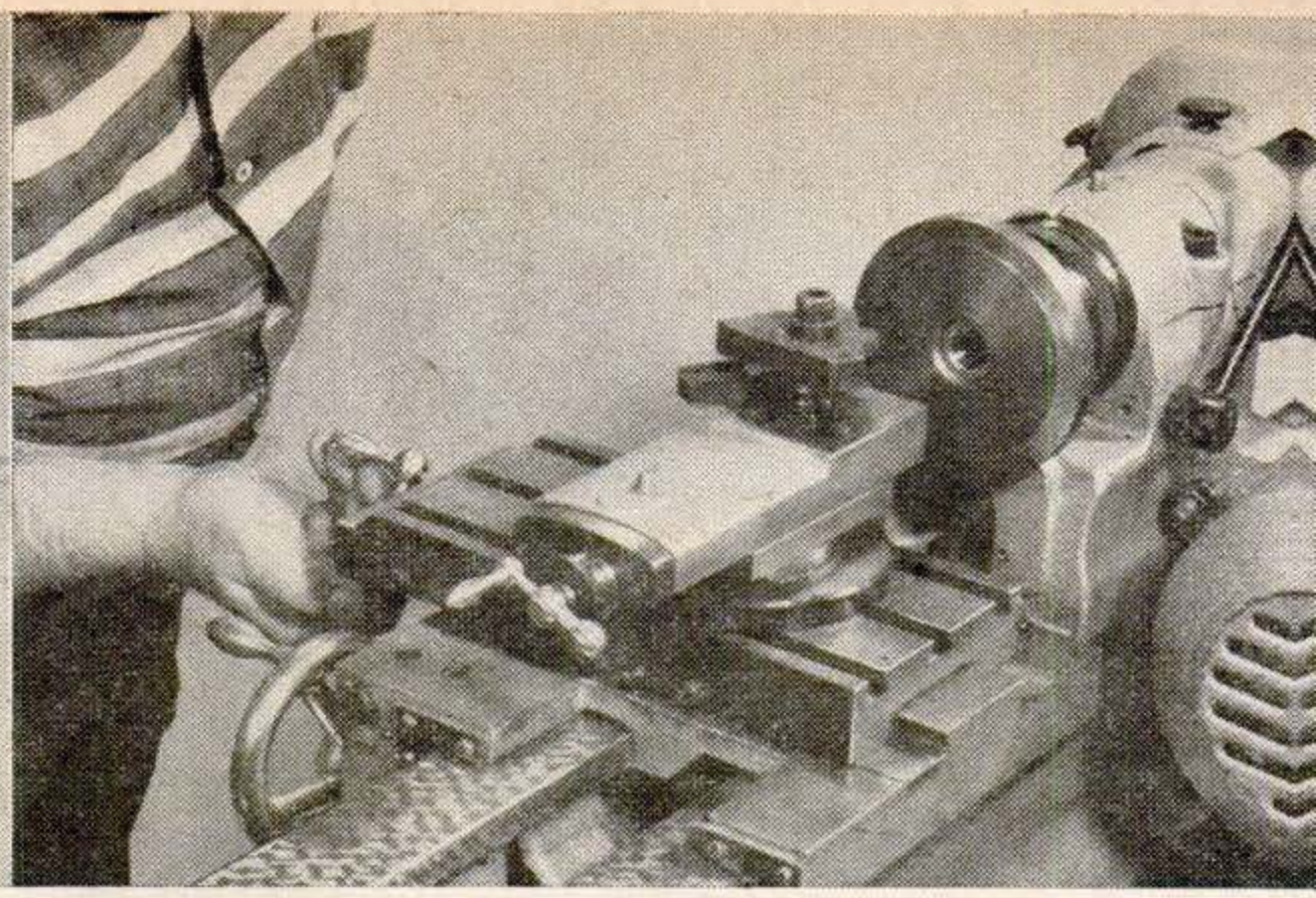
**NO OIL THROWOUT FROM THIS MACHINE:** All bearings, including those on the change-gear carrier, are equipped with small grease fittings. A special push-type grease gun is part of the standard equipment of the lathe.



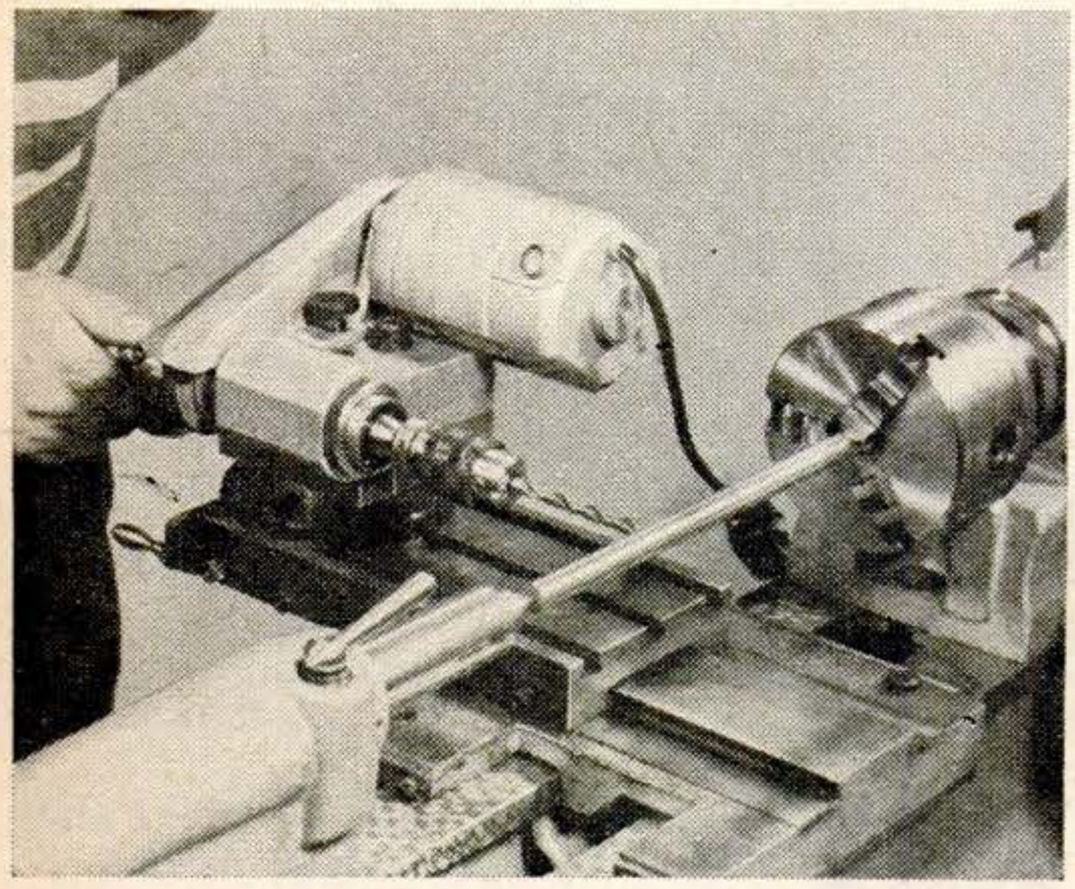
CONTINUED



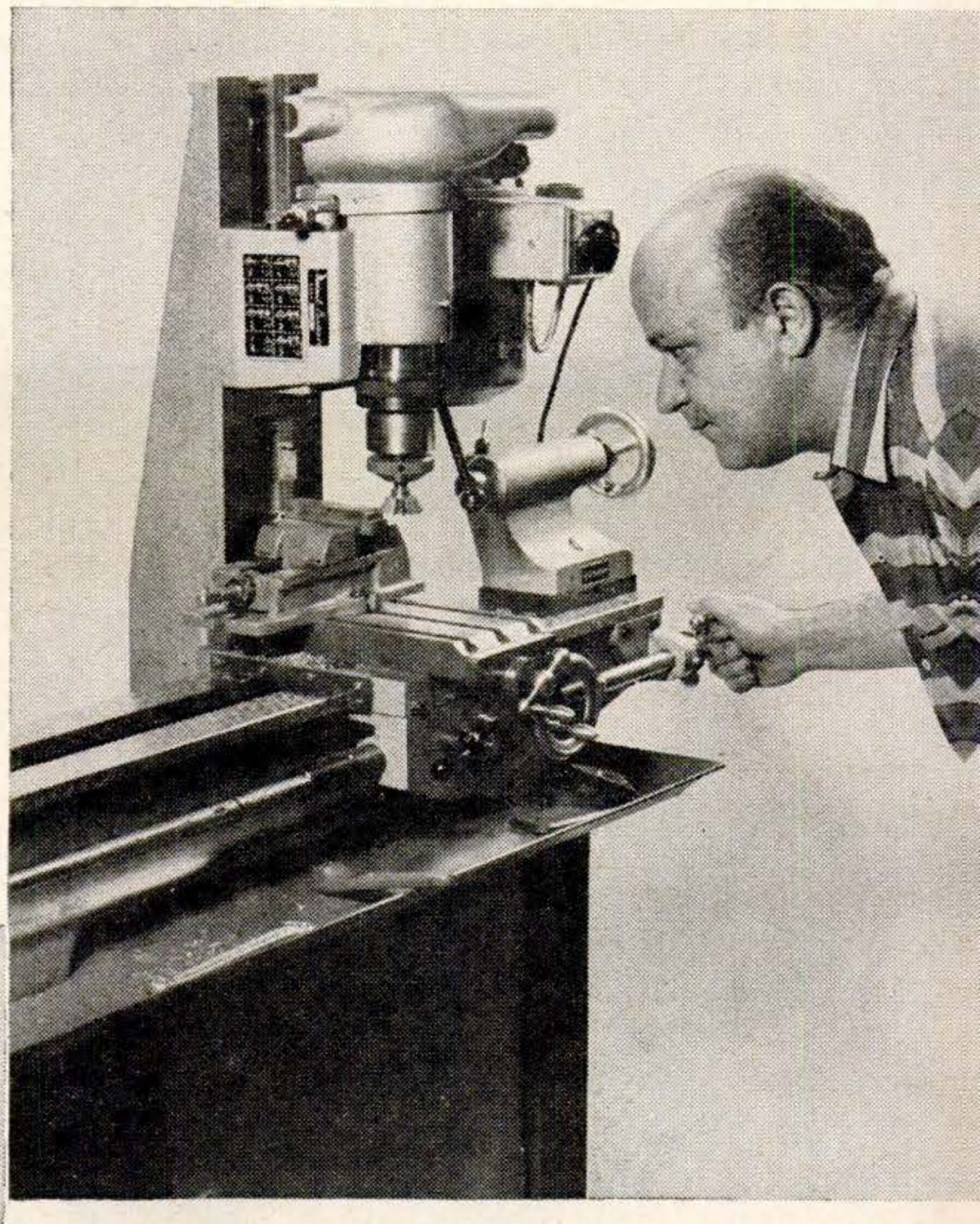
**HANDCRANK** on the tail end of the lead screw permits fine manual carriage feed for delicate turning, or for jobs such as grinding, when the work is held stationary between centers. The lead screw is mounted on ball bearings.

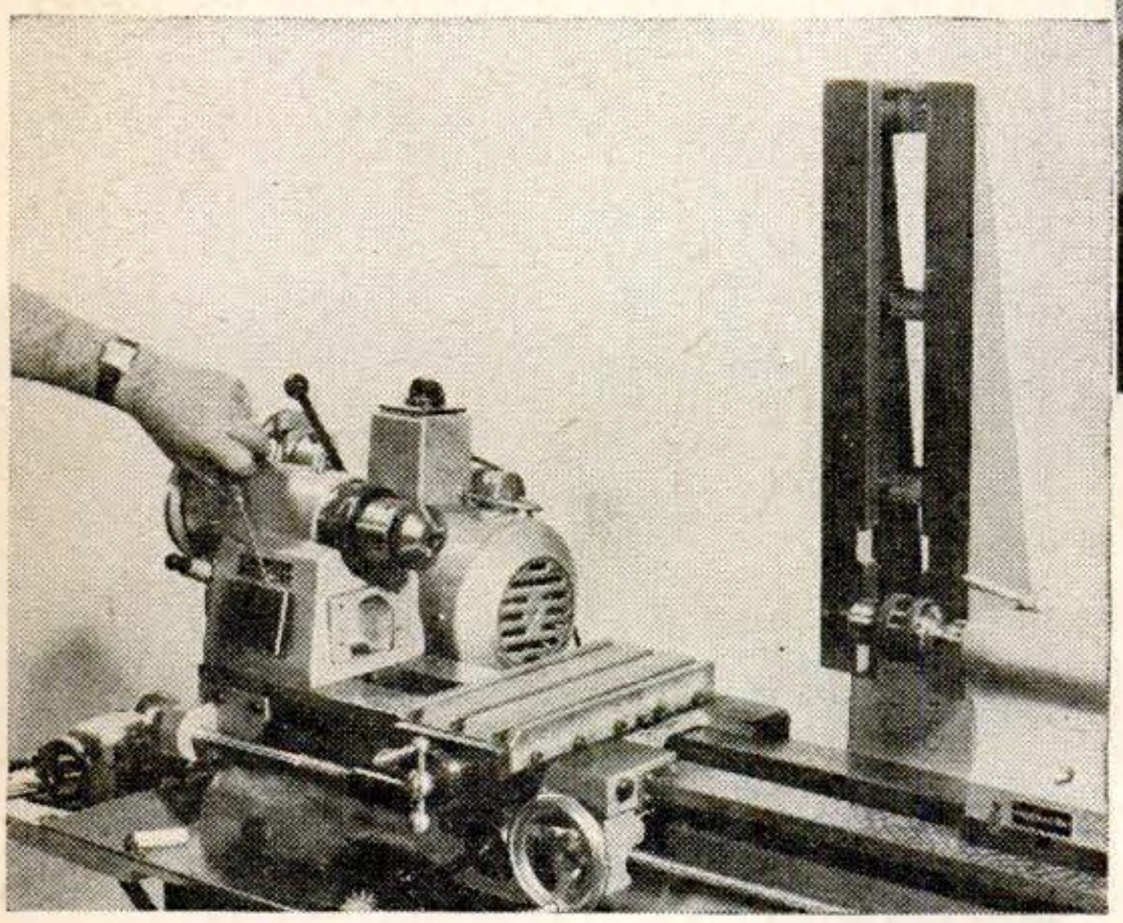


**EXTREME ACCURACY** of the chuck and collet nose results from custom-fitting their mounting plates to the headstock spindle. The plates are screwed on the spindle, and then faced and shouldered to insure perfect alignment.



**TOOL-POST GRINDING ATTACHMENT** comes with chuck for cross-drilling work held between centers. With the proper wheels and shank-mounted stones, external and internal precision grinding can be done, using power feed.





**CONVERSION TO VERTICAL MILLING MACHINE** takes only minutes. Vertical bed bolts to rear of main bed, and headstock is removed from lathe and mounted vertically. Prying off nameplate (left) exposes bolts that lock headstock in place. Setup illustrated above shows the milling operation. Vise is bolted to T slots in the wide cross-slide table. Headstock spindle can be fed downward by a hand lever for drilling, and locked in position for milling.



Copyrighted material

# Short Cuts and Tips

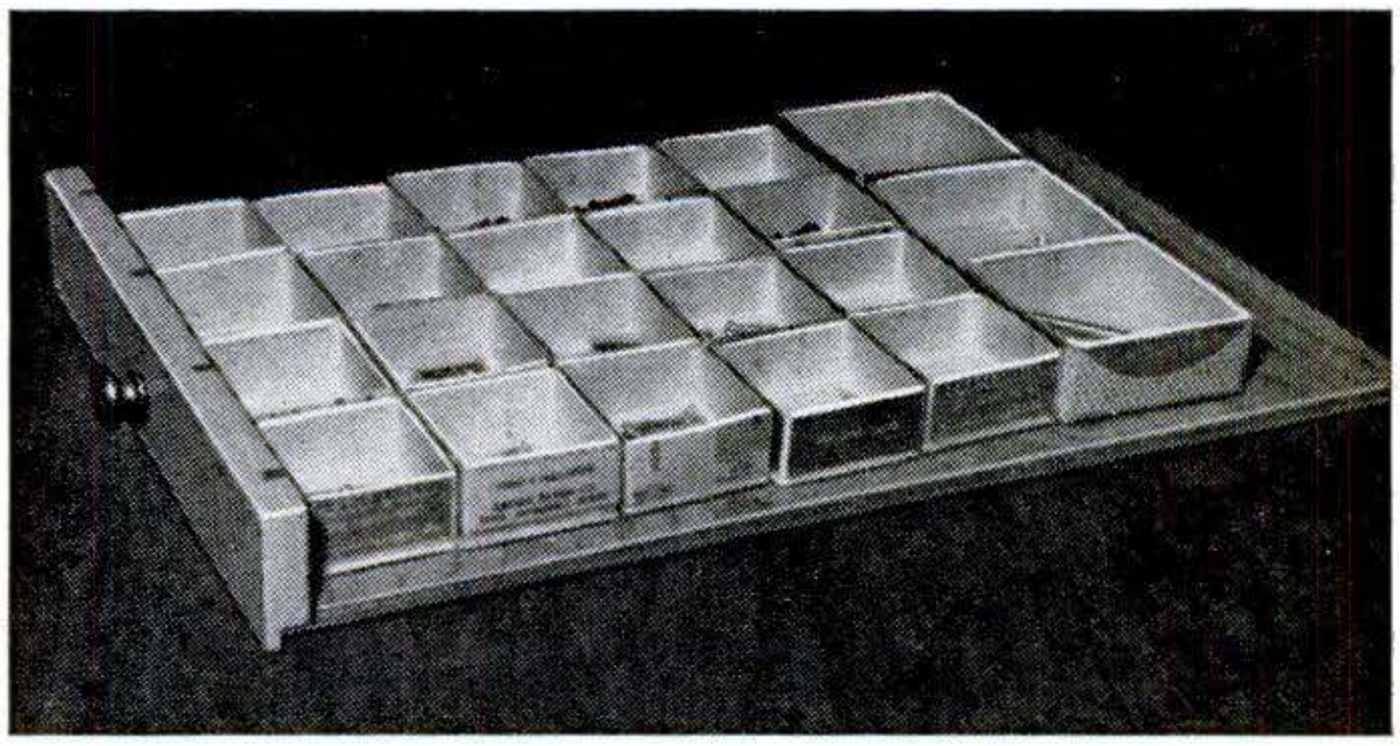
FROM PS READERS

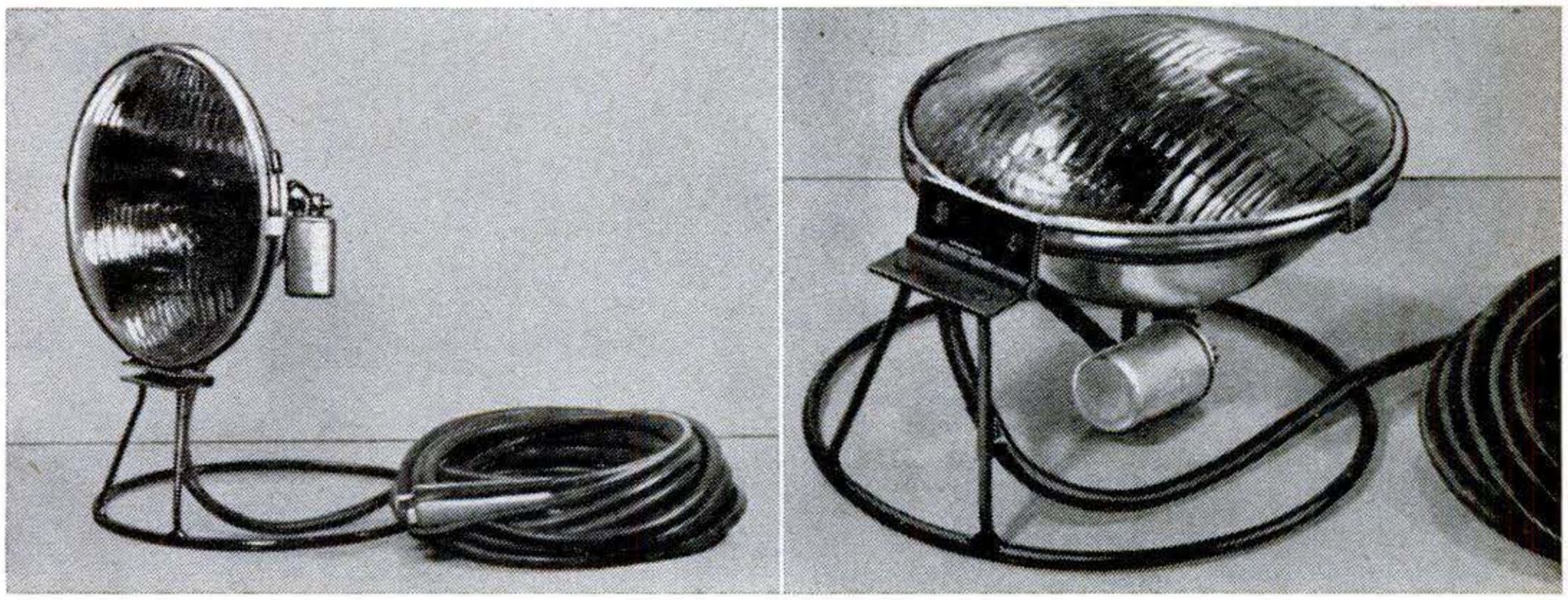
## Starting Plants in Paper Cups

GARDENERS can make good use of paper cups—the rigid, cylindrical kind. Fill them with soil and start vegetable and flower seed in them during the early spring months. At transplanting time, simply cut out the bottom of the cup. No need to disturb roots.—*William B. Egan, Maceo, Ky.*

## Bins for Storing Small Parts

INEXPENSIVE bins for sorting out and storing fasteners and small parts can be made by slicing through one- and two-quart milk cartons about 2″ from the bottom and tacking these cup-like sections to a drawer bottom or pull-out slide.—*J. R. Hotz, San Diego, Calif.*





## Three-Way Emergency Light

THIS simple rig gives me a portable trouble light, a flashing red emergency light, and a spare headlamp all in one. A headlamp is clamped in a wire ring soldered to one leaf of a hinge; the other leaf is soldered to a simple bent-wire stand so the lamp can be tilted. A flasher unit is wired to the lamp's terminals with 15′ leads.

For use as an emergency light, I cover the lamp with red cellophane and clip the leads to the car battery. For a trouble light, I remove the cellophane and short out the flasher. And when a headlight burns out, I use the trouble light as a spare.—*Robert Micals, Freehold, N. J.*

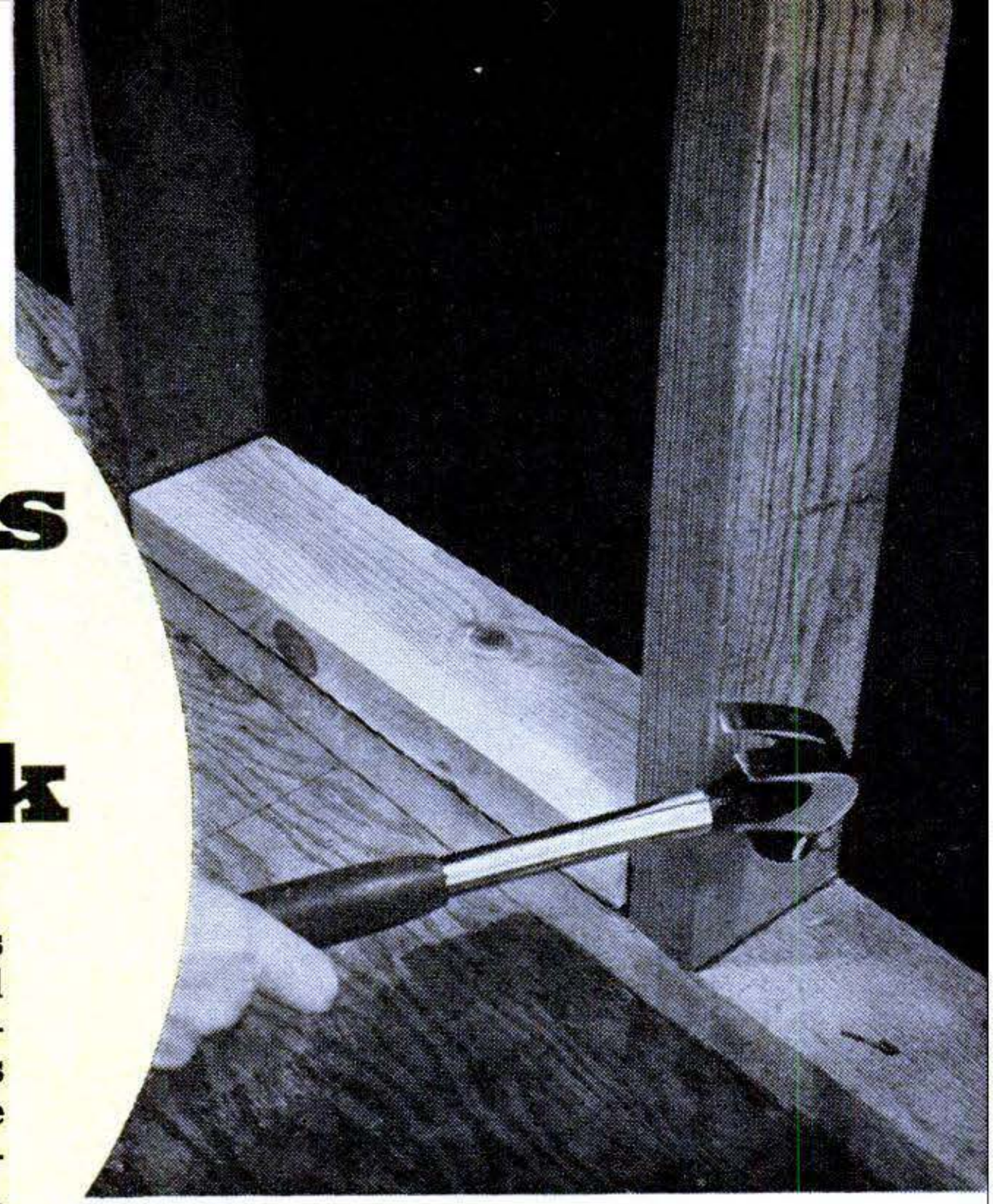


Copyrighted material

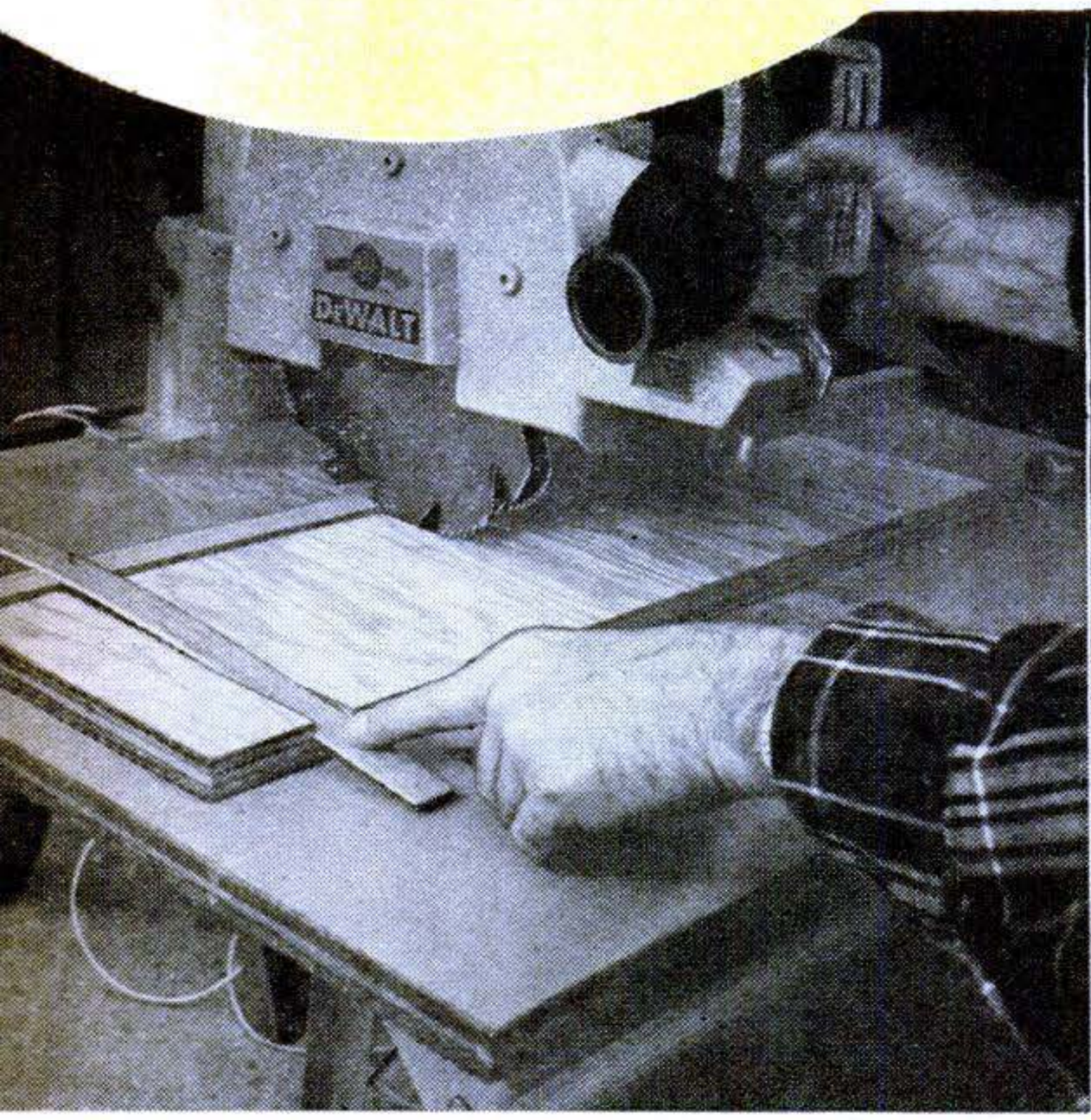
# 14 Short Cuts to Faster Shopwork

WHY do it the hard way? These tricks get the job done more quickly—and more accurately. The secret? Never translate a measurement into inches or angles where you can transfer it directly to the work. You'll save time-consuming calculations—and the chance of a costly goof.

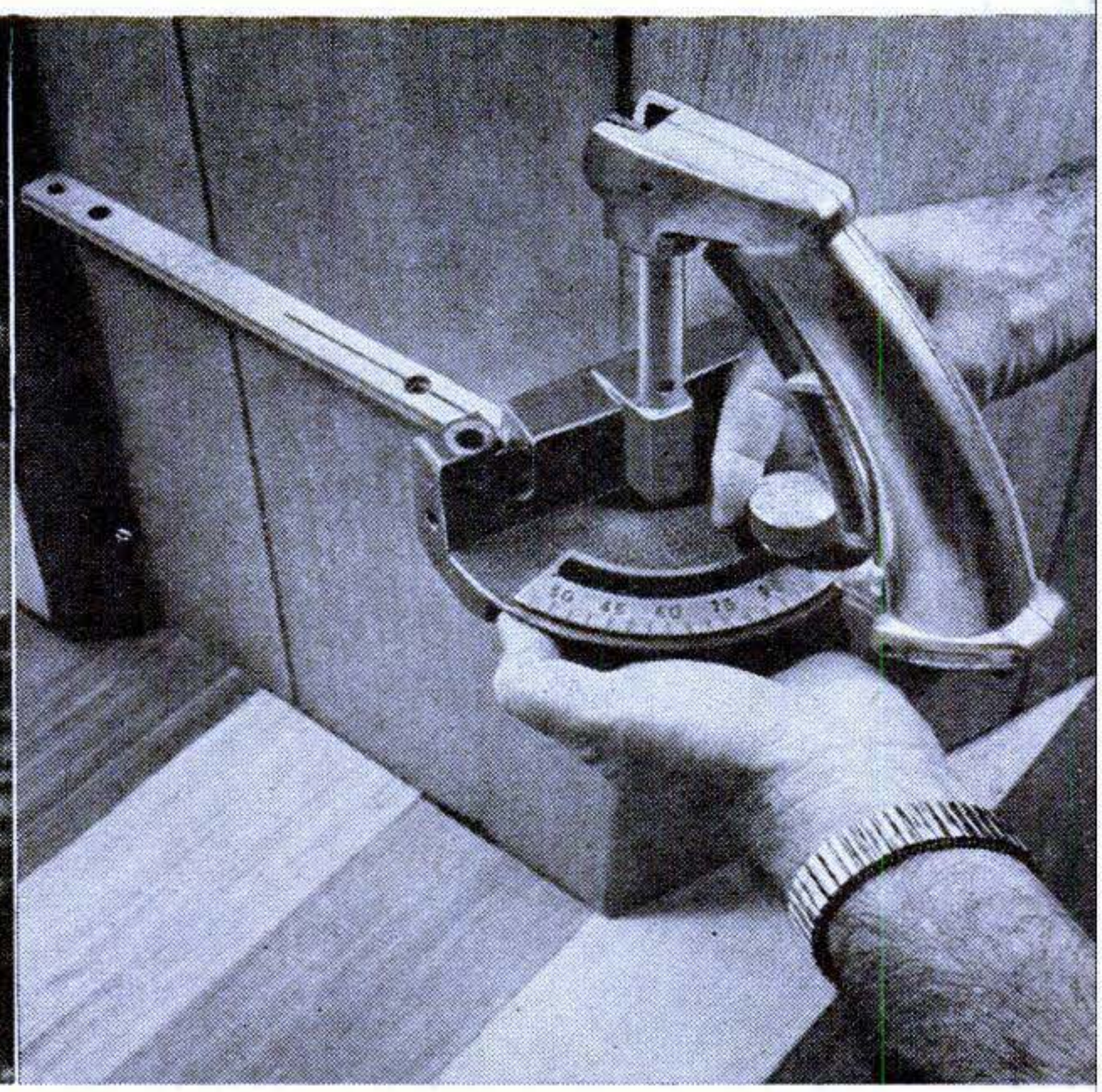
**By Darrell Huff**



**STUDS WON'T SLIP** while you toenail them if you back them up with two-by-four gauge blocks cut to the correct spacing. The blocks can be removed and used later for cats or fire stops.



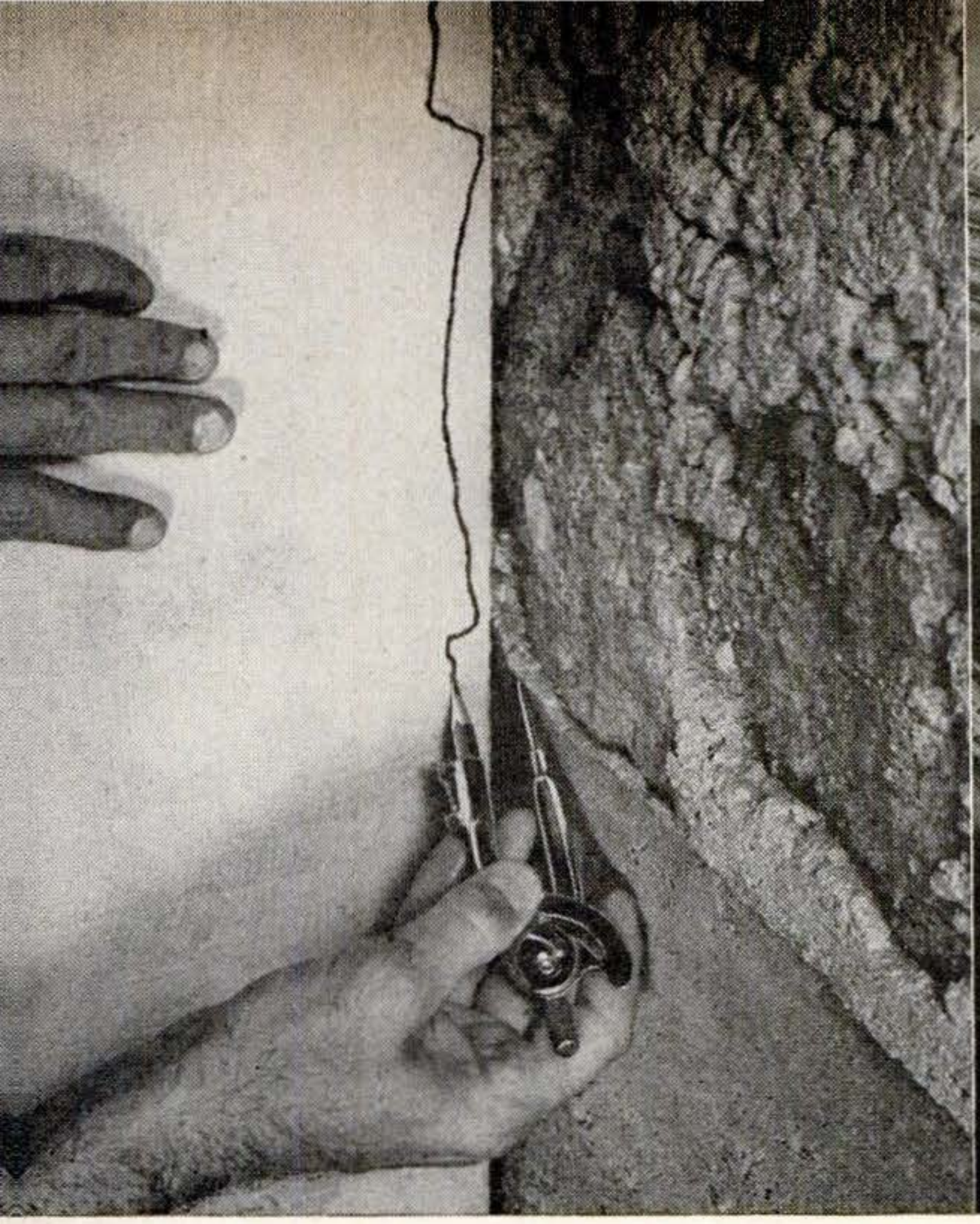

**DADOES ARE SPACED AUTOMATICALLY** in this setup for making evenly divided bookshelves. A strip of scrap cut to the width of the dado and fastened to the table is pressed into the first cut to line up the second cut. The second cut then lines up the third, and so on.



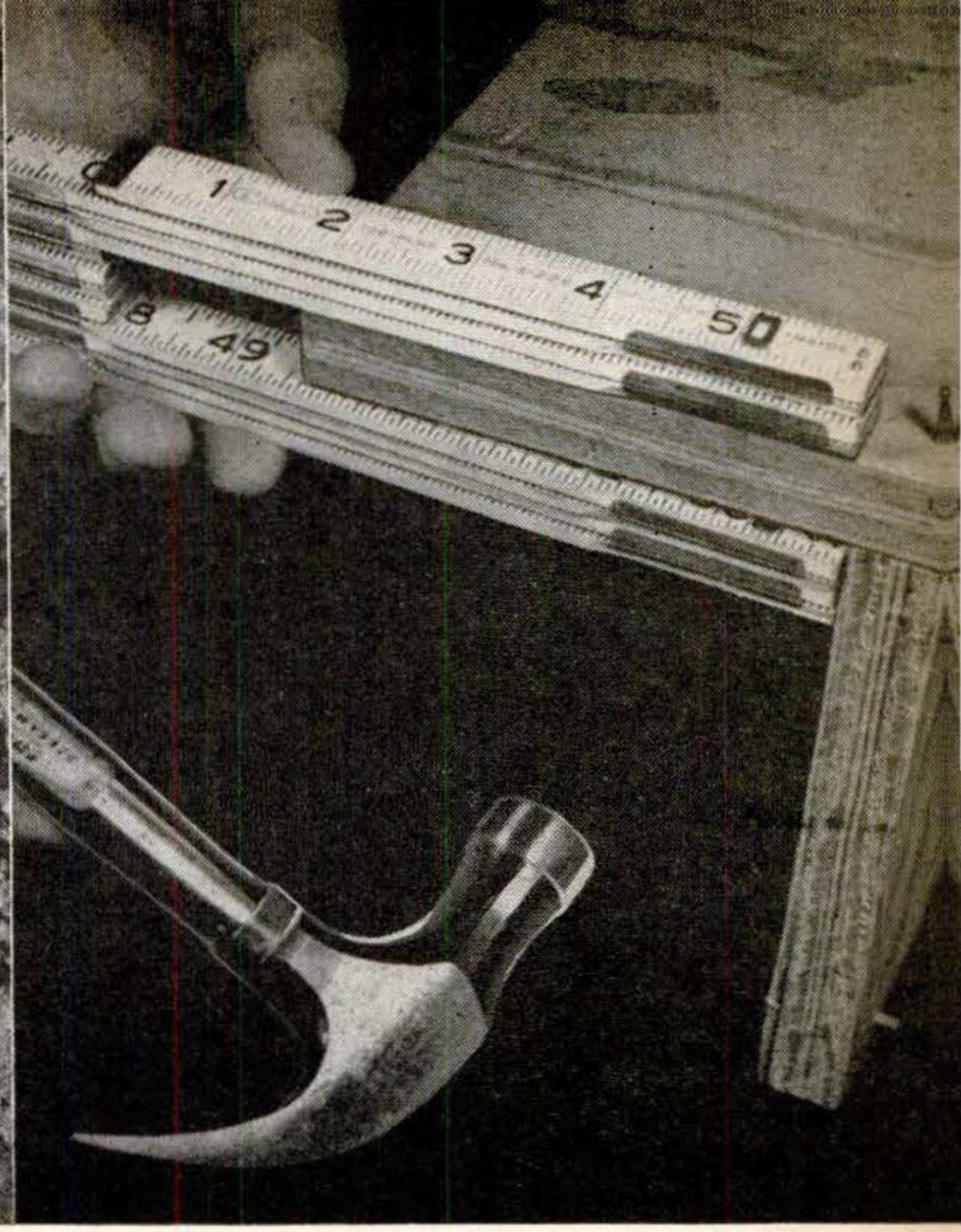
**USE A MITER GAUGE** to measure angles directly by holding it against them. Then don't even read the angle. Just saw the work with the miter gauge as it's set, or use the gauge to trace the angle onto the work. Even the oddest angles will match perfectly this way.



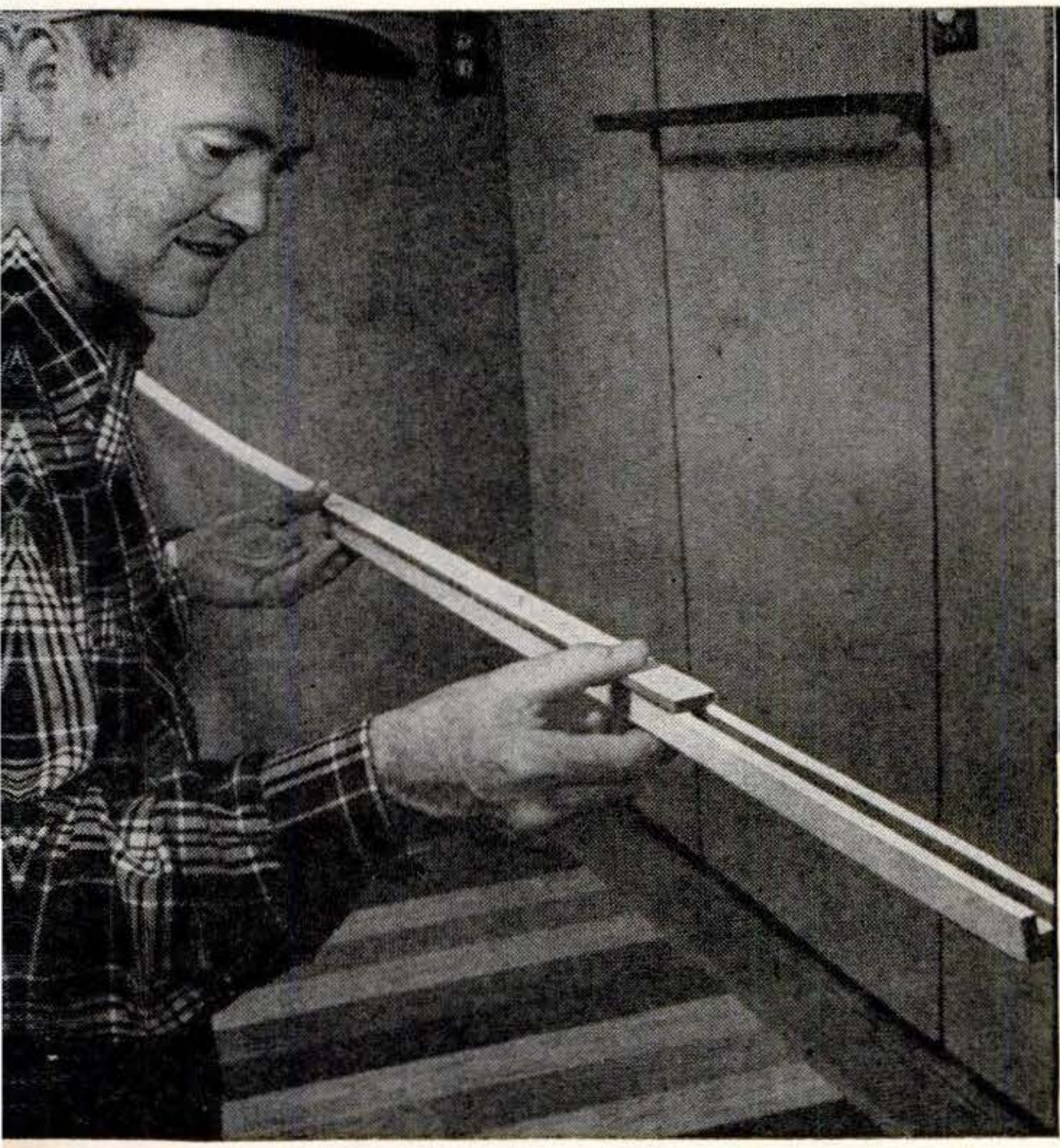
Copyrighted material

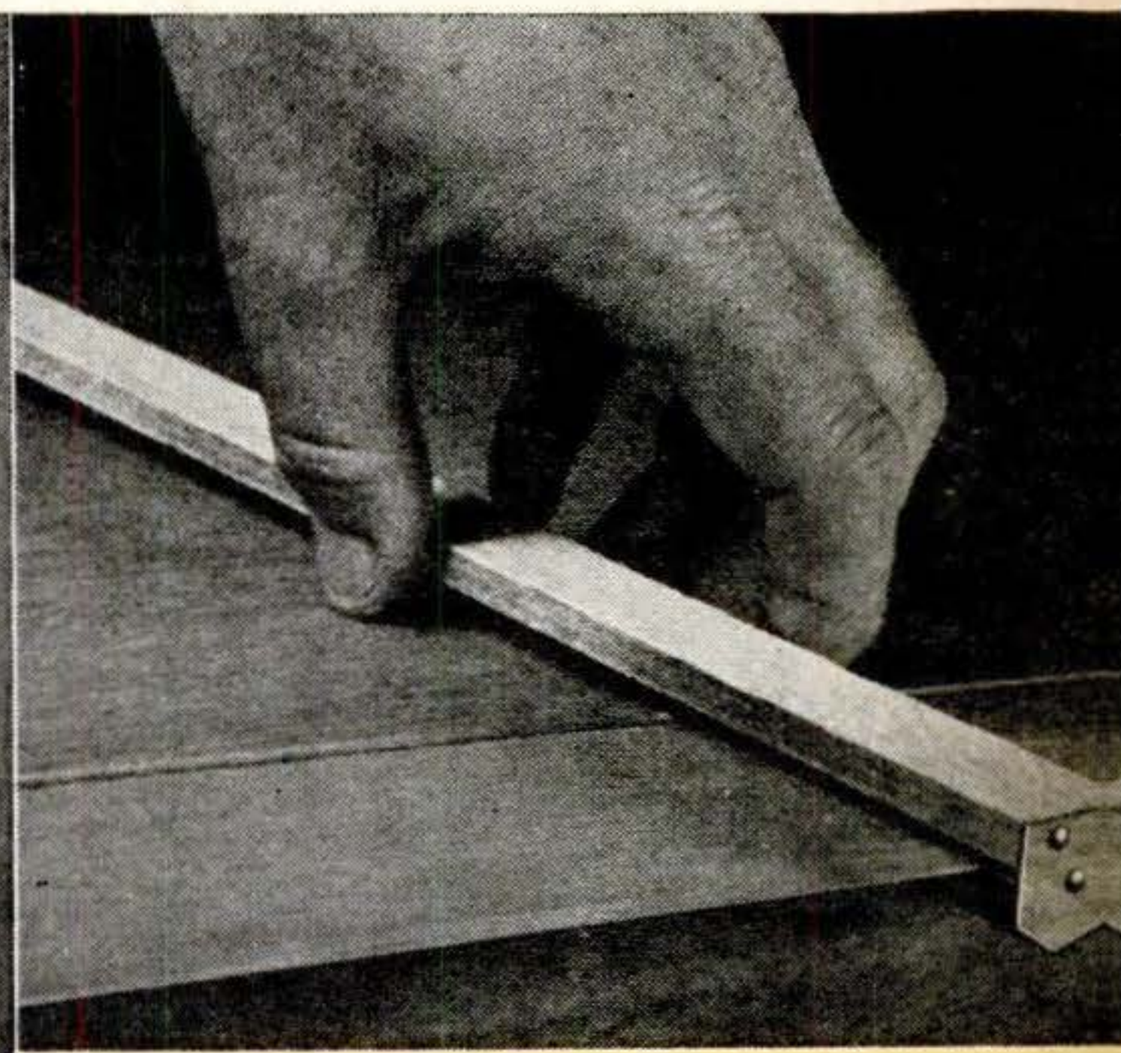


**FOR TRACING ROUGH OBJECTS,** try an ordinary school compass. Its sharp point will easily follow the roughest irregularities, giving you an accurate copy of the object's profile.




**CAN'T SEE WHERE YOU'RE NAILING?** Fold a rule so that it straddles the work like this. It will then serve as a quick-reading "feeler" gauge to keep the lower board lined up.



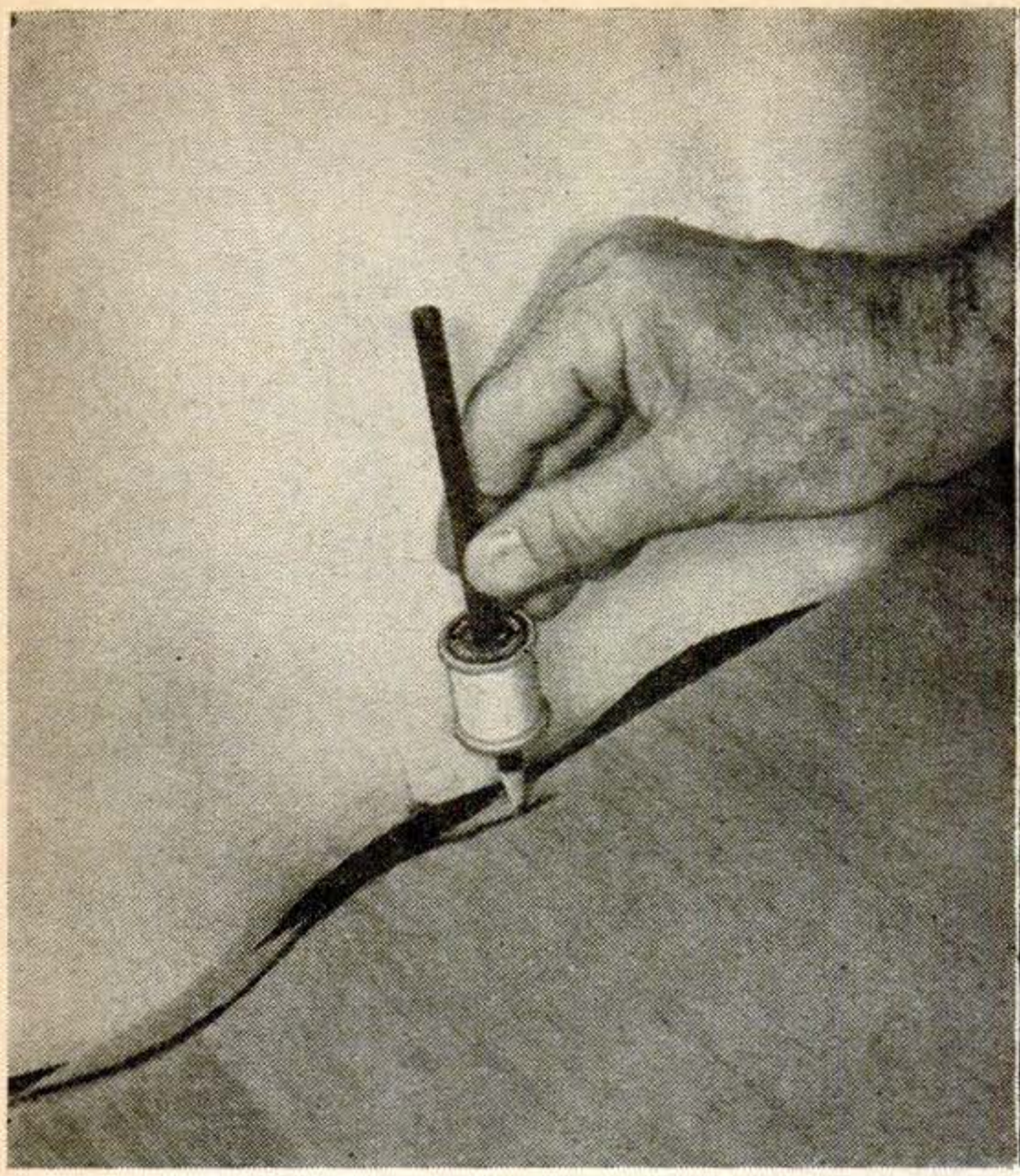


**YOU WON'T NEED A HELPER** to make big measurements with this aid. Rip a strip off each edge of a tongue-and-groove board and use the two mating tongue-and-groove sticks to form a sliding gauge that can be spread apart for inside measurements, as at left. For outside measurements, tack small metal tabs to the ends to serve as hooks, as above.

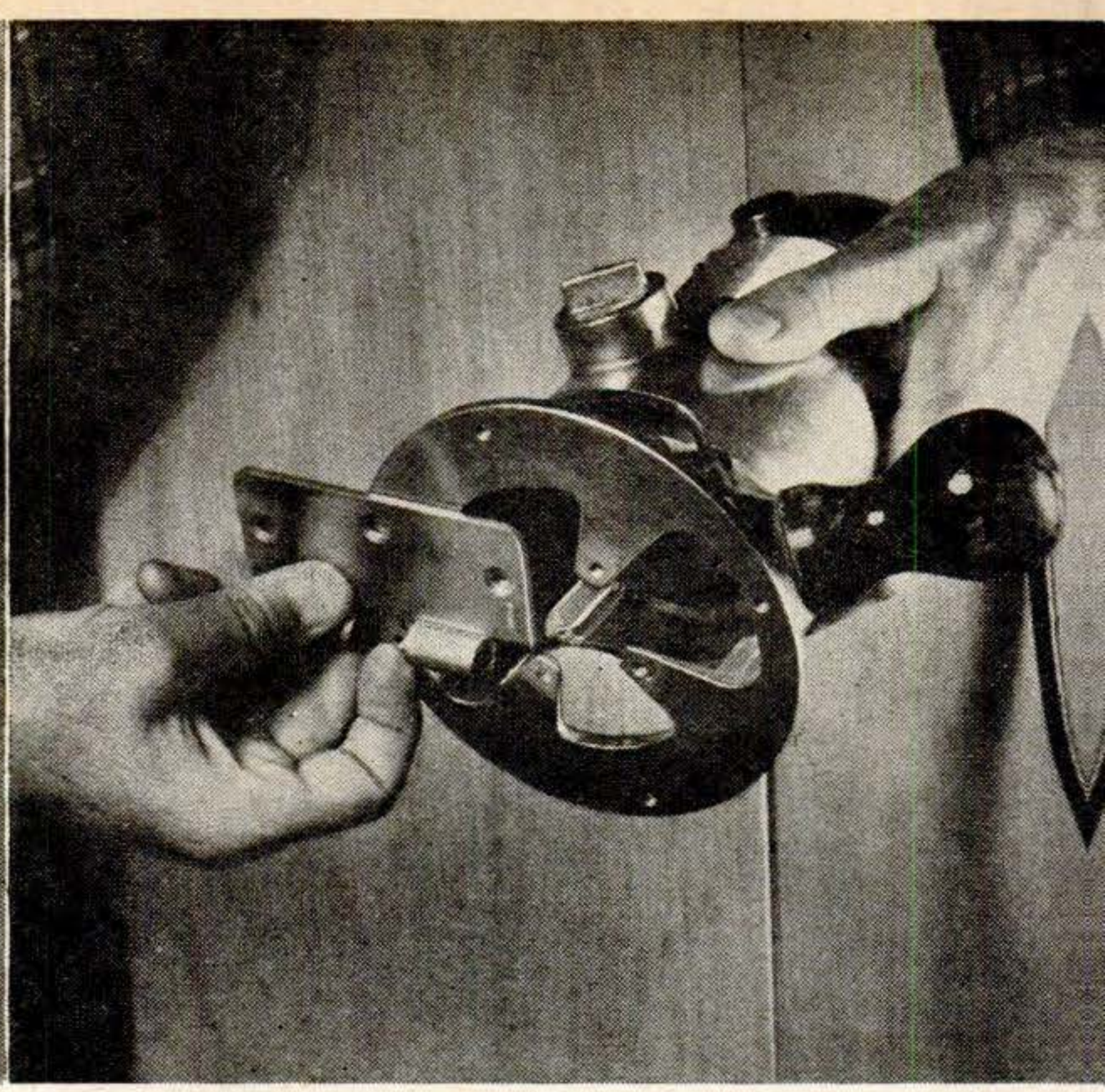
CONTINUED



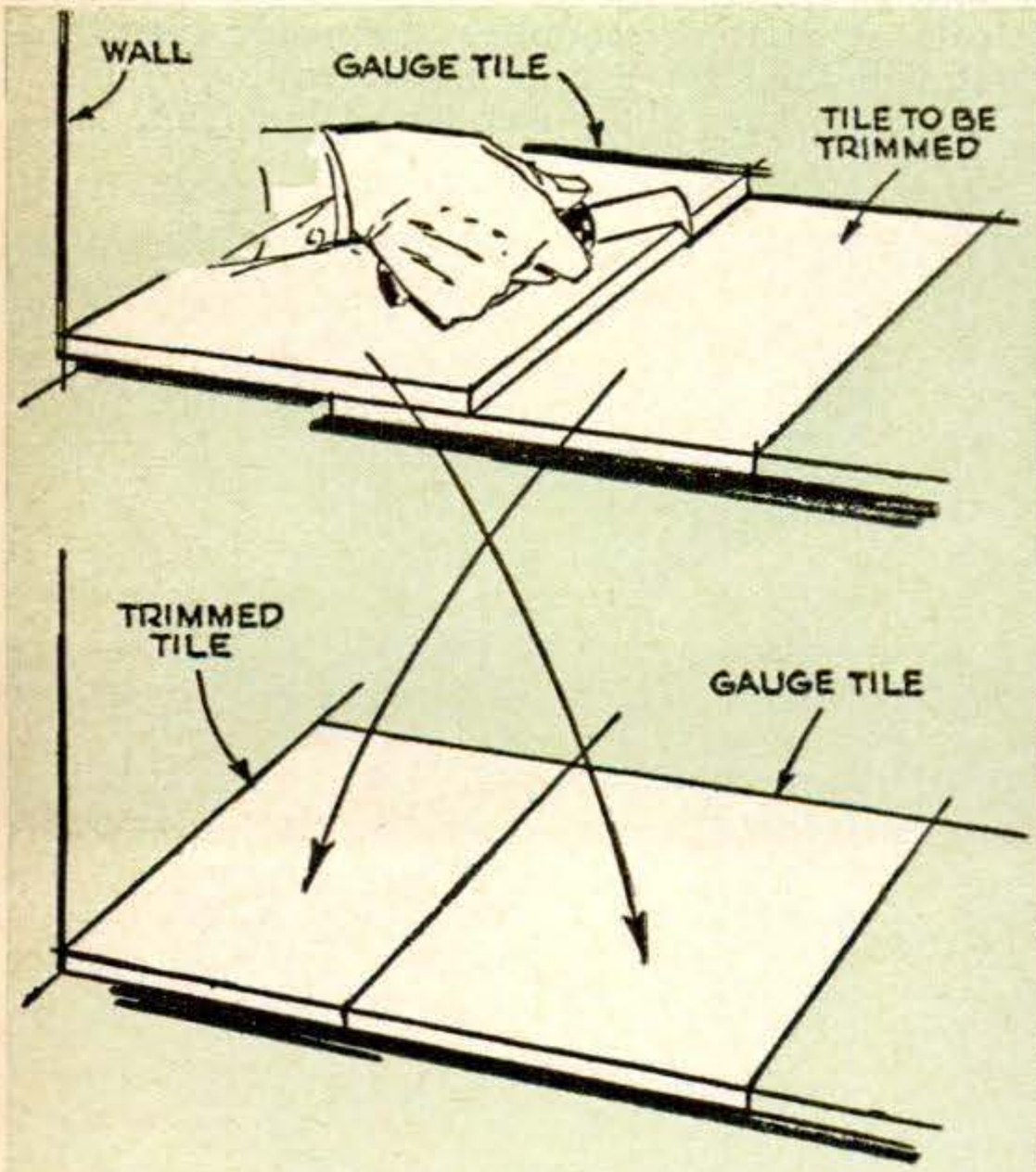
Copyrighted material



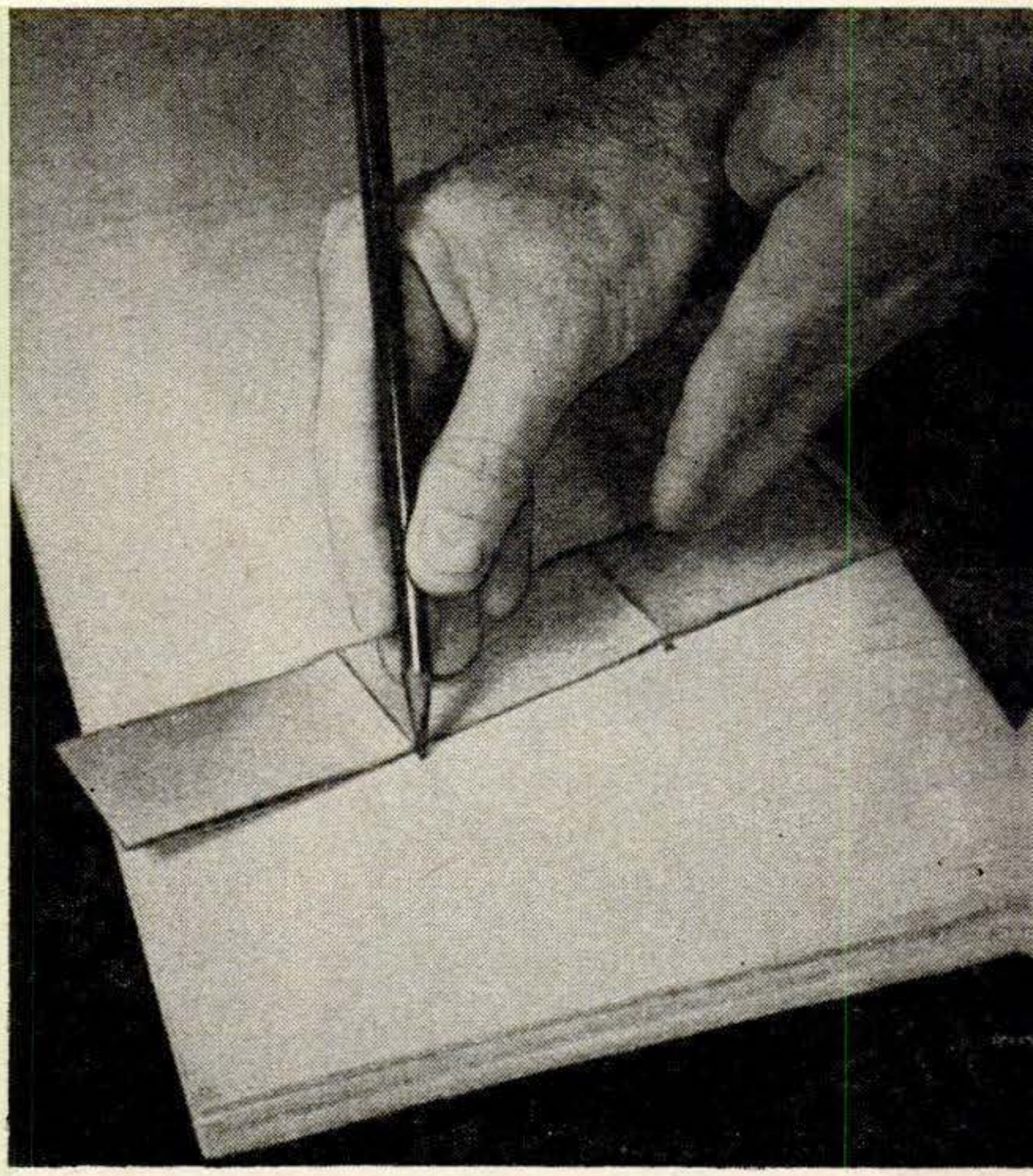
**ROLL THIS SPOOL** along curves and other irregular shapes, and the pencil will transfer an exact copy of the contours onto your work.



**A PERFECT HINGE MORTISE** is easy to make if you use the hinge itself as a gauge to set the router bit to the required cutting depth.



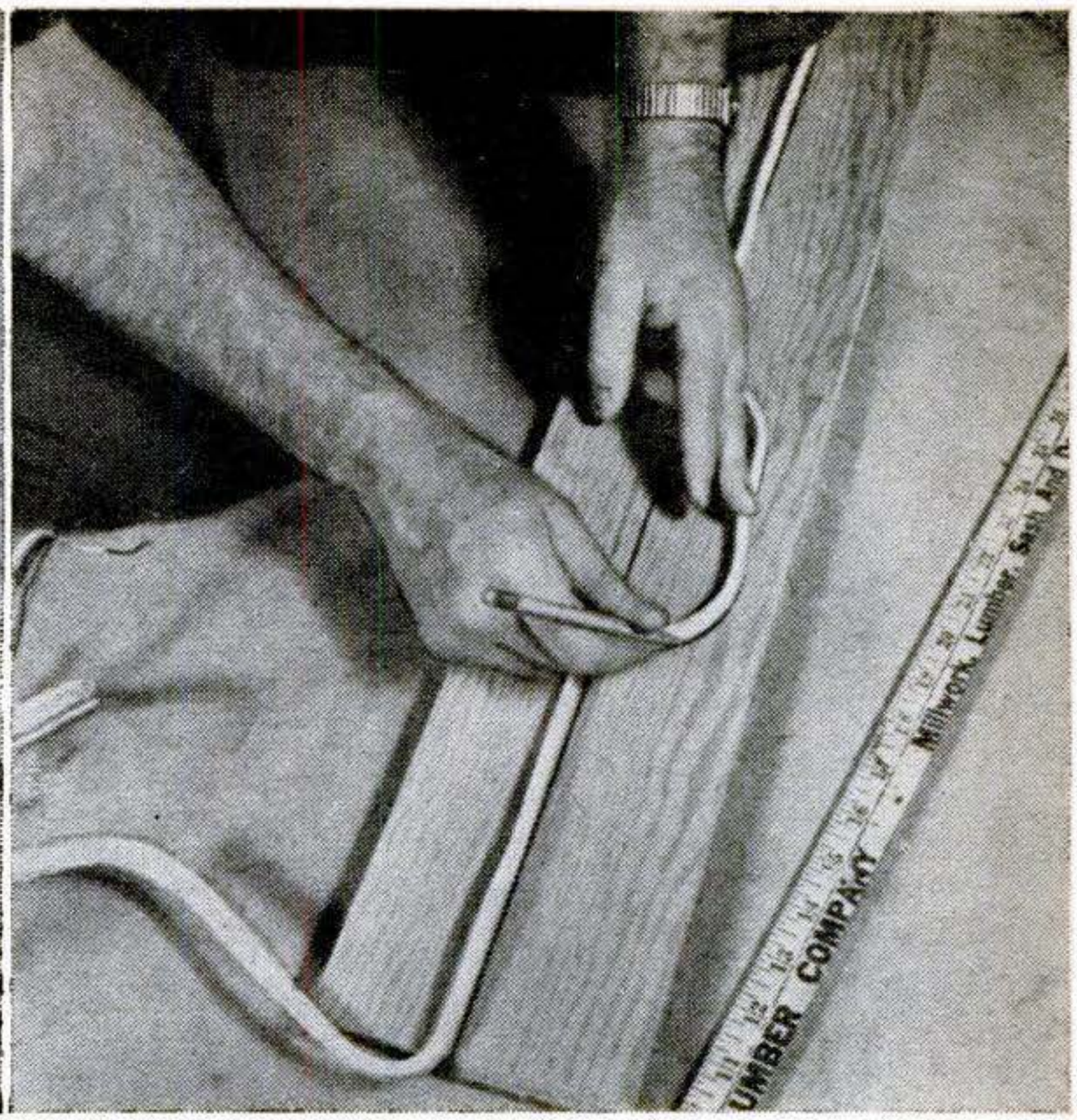

**CUTTING FLOOR TILES** to fill gaps is faster and more accurate with this professional trick. Instead of cementing down the last full tile, leave it loose. On top of this place another full tile butted against the wall. Score the lower tile with the cutter against the edge of the upper one. The upper gauge tile then becomes the last full tile, and the piece trimmed off the lower tile fits with real professional accuracy against the wall.



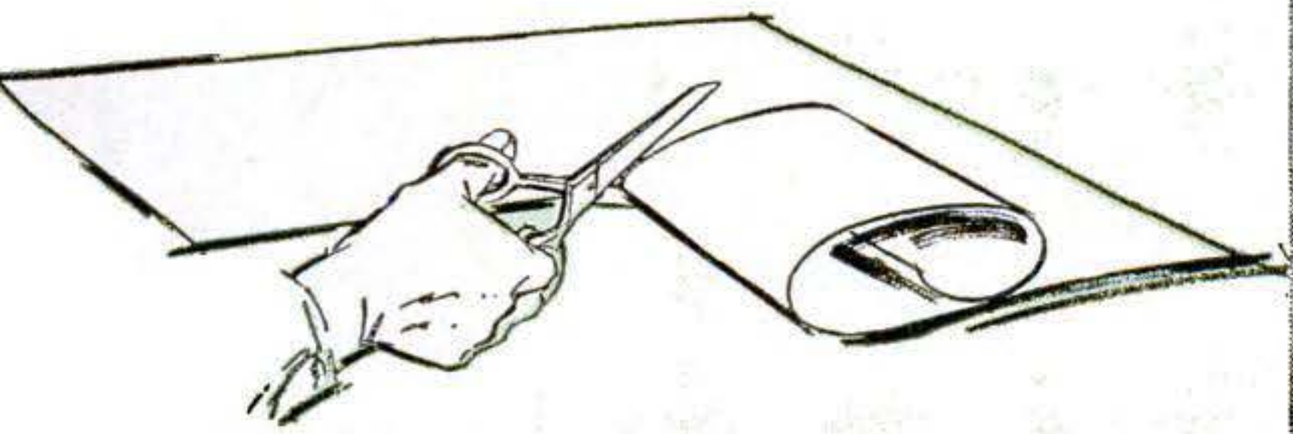
**TO RIP A BOARD** into equal widths, take a strip of paper slightly longer than the wood is wide, fold it into equal parts—thirds, fourths, eighths, etc.—and lay it across the board diagonally so the ends touch the edges. Marking the board at the fold lines will quickly give you equally spaced divisions.



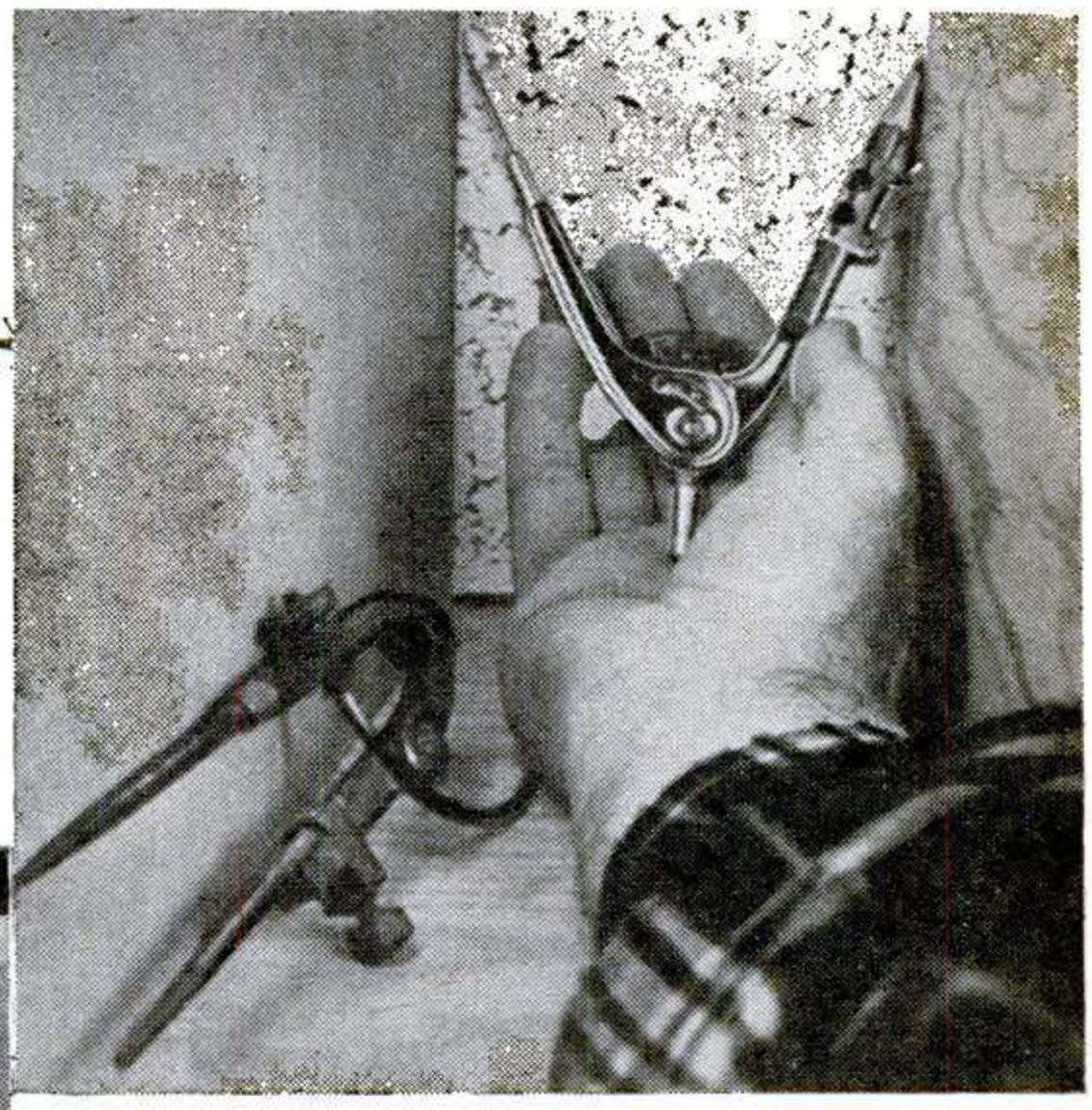
Copyrighted material



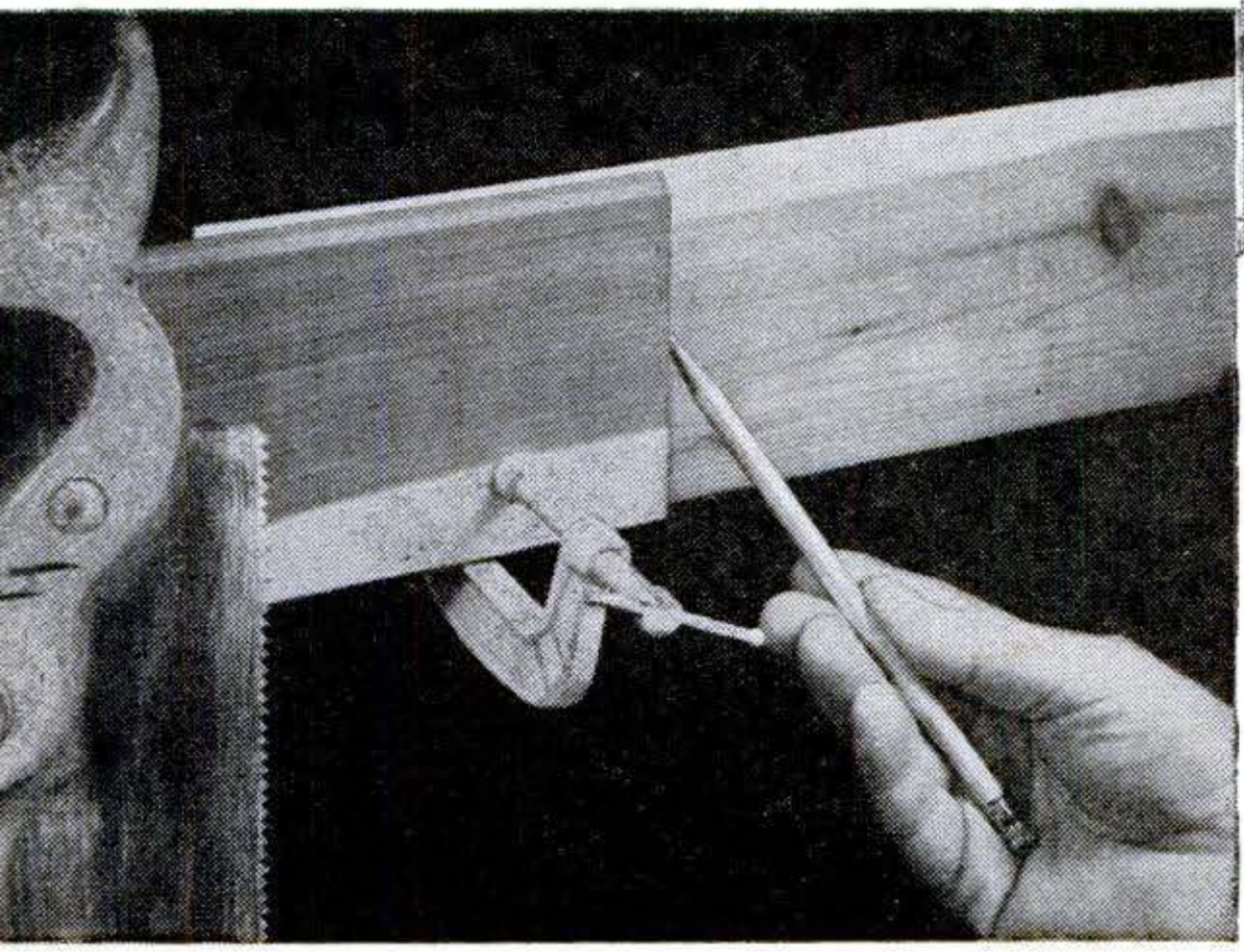

**BEND A STIFF WIRE** to match the shape of irregular surfaces where you can't reach in to measure, as above at left. Then use the wire to trace the shape onto your work, as at right.



**CUTTING FLEXIBLE MATERIALS** calls for constant remeasuring to make sure you're on the line. Instead, keep folding the material ahead as you go and let the part you've already cut do the measuring automatically for you.



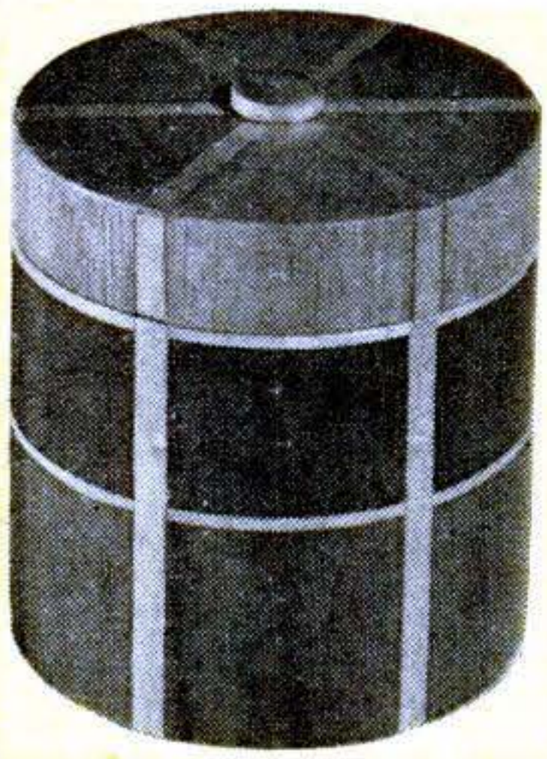
**WHERE A RULER WON'T REACH,** you can take the measurement with a compass or dividers like this. Transfer the measurement directly to the work without translating it into inches at all. You'll save time and the chance of making an error.



**SAVE FUSSY MEASURING** where two or more boards are to be joined end to end. Simply overlap the boards and clamp them so they give the desired total length. Trim off one lap.



Copyrighted material



# Lathe-Turned Jewel Box

**By Edwin M. Love**

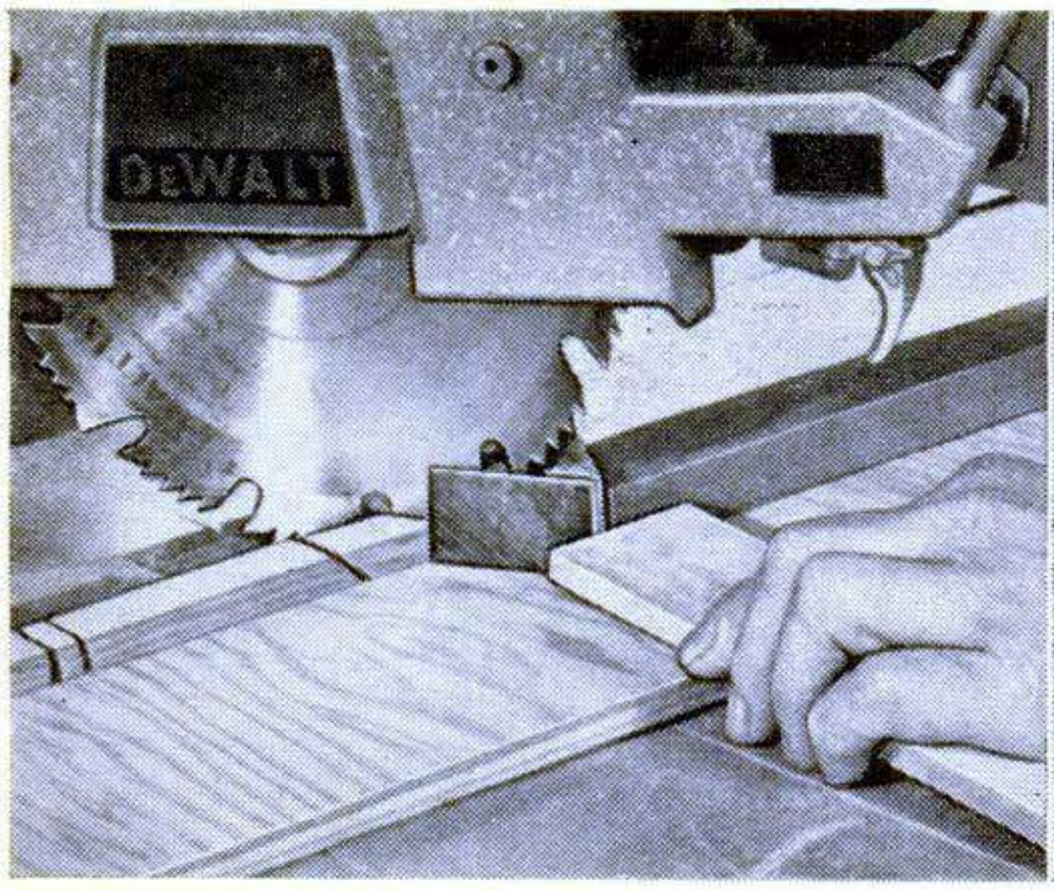
THIS two-tone box is turned from glued-up layers of mahogany wedges. The horizontal stripes are formed by sandwiching 1/16"-thick hexagonal hoops between the stacked wedge assemblies. The top (lid) layer is glued on with a piece of paper between it and the upper hoop so that it can be split off easily after the outside is turned.

Leave the rest of the cylinder in the lathe and hollow out the interior. Next chuck the lid, notch a lip on the lower edge, and gouge the bottom concave.

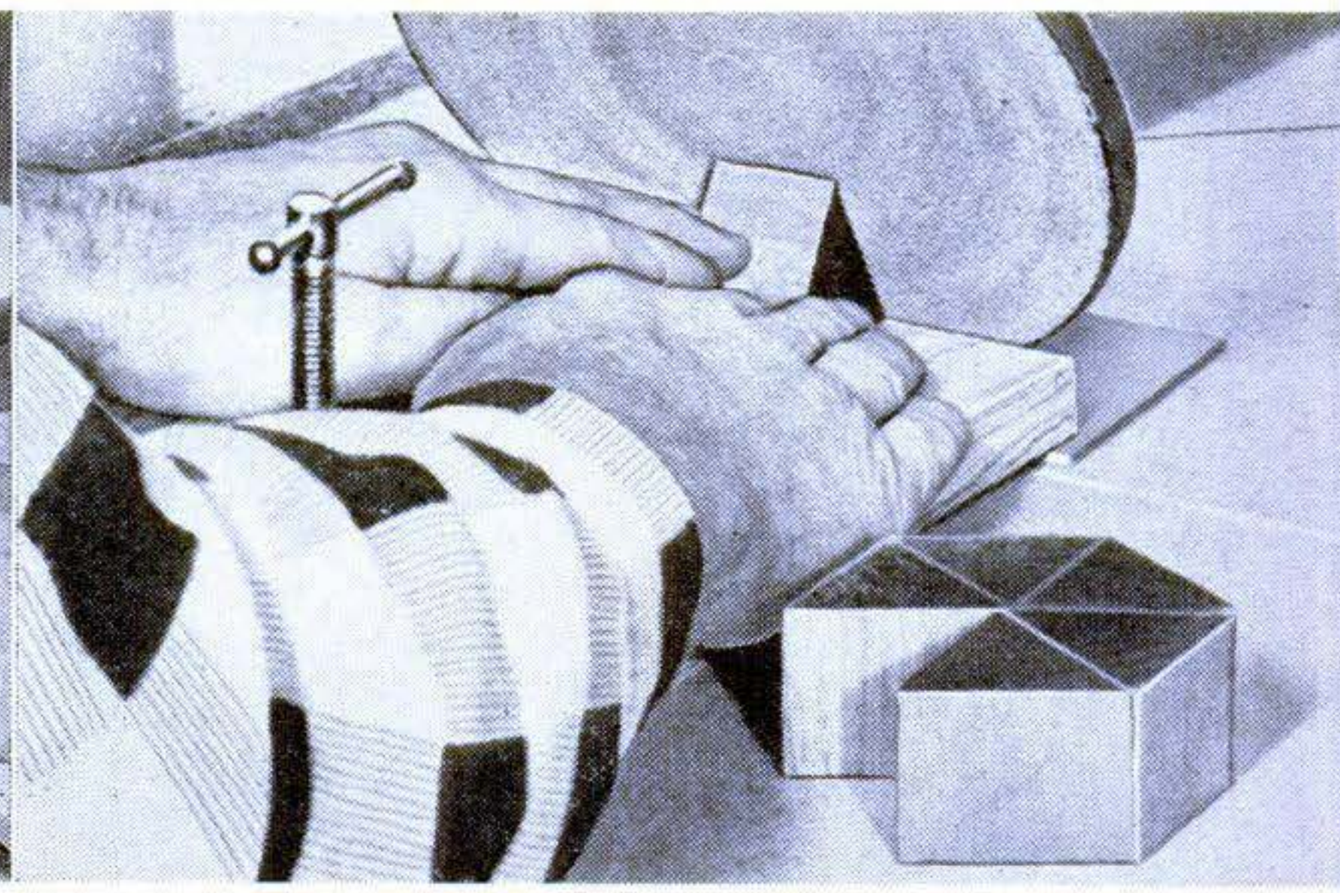
With the lid back in place, secure the finished turning in a bolt clamp made from two scrap blocks bored to take four carriage bolts. As shown in a photo below, clamp the lower block in a vise and cut the intersecting grooves across the top, using the edge of the upper block as a fence to guide the saw. You must, of course, reposition the cylinder in the clamp after each cut.

The lower sketch at right shows the clamp's second position in the vise—for grooving the vertical joints. There will be a center "fin" of wood between the two parallel saw kerfs that determines the width of each groove. Rake this out and smooth the bottom of the groove with the edge of a flat file.

Trim the maple inlay strips to length and glue them into these grooves. Inlay the lid separately. Where the side and top strips meet, miter them to conceal the end grain. The center button is a ¼"-thick slice from a maple dowel. Glued on to hide the ends of the inlays, it saves tedious mitering. Sand all inlays flush after the glue sets, and apply a clear finish. Rub to a satin texture.



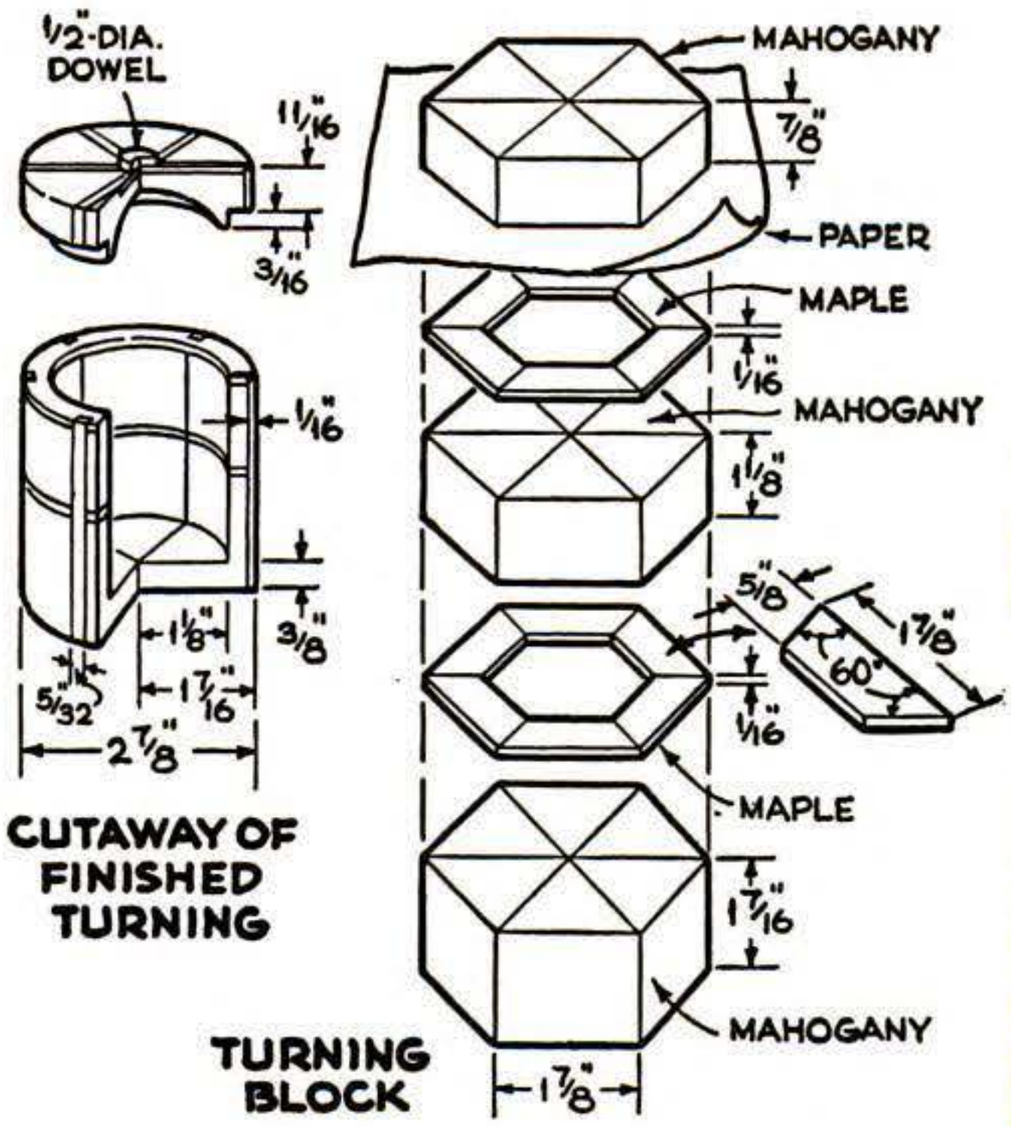

**TRIMMING BLOCKS TO SIZE** on a radial-arm saw requires a length-gauge strip with one end mitered at 60 degrees. A push stick holds the block against the gauge strip and fence.

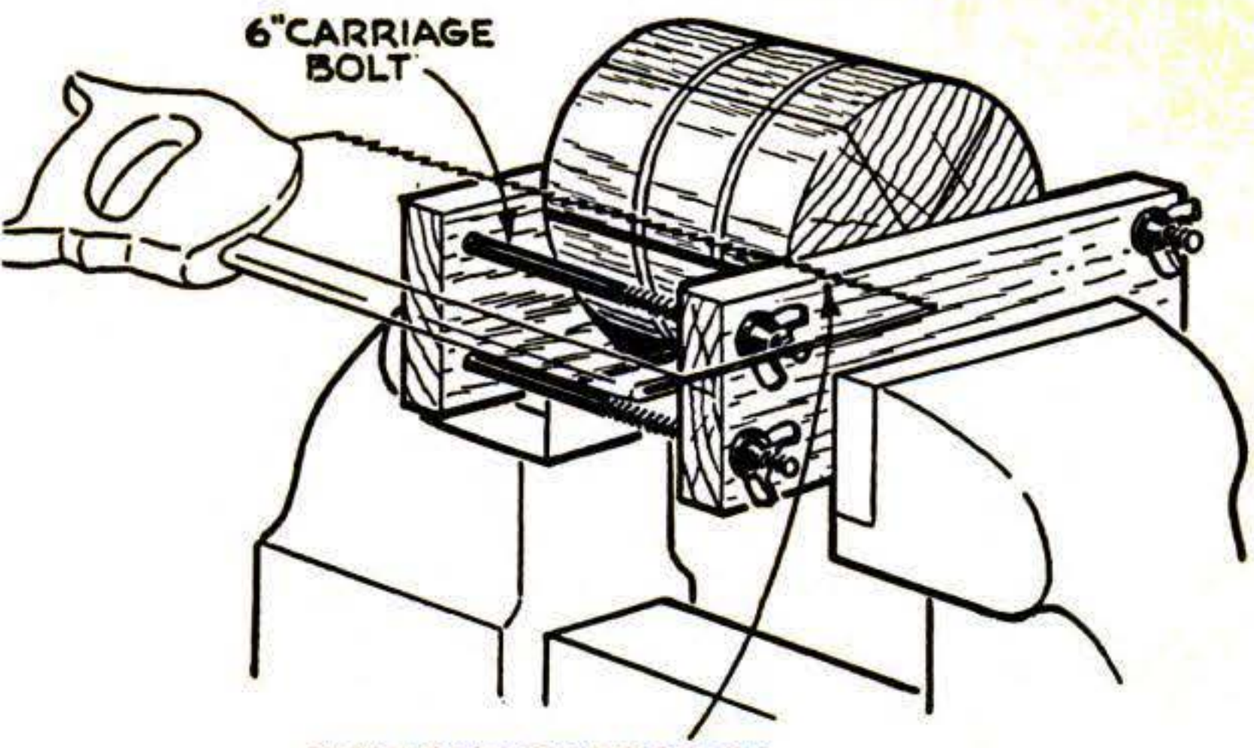


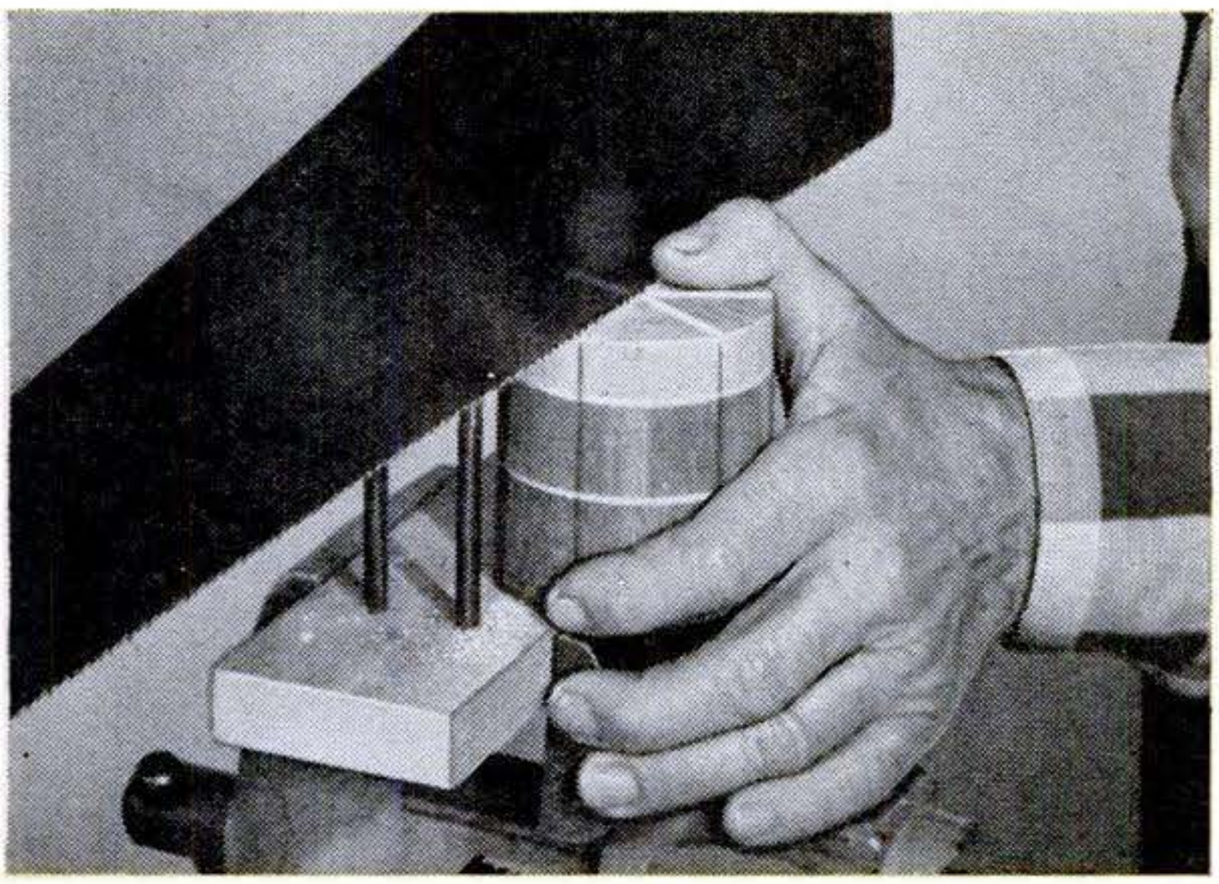
**SAND BLOCKS FOR ASSEMBLY** by tilting disk at angle of cut. Rest final block on board that is shimmed up with piece of thin cardboard to permit adjustment for exact angle required.



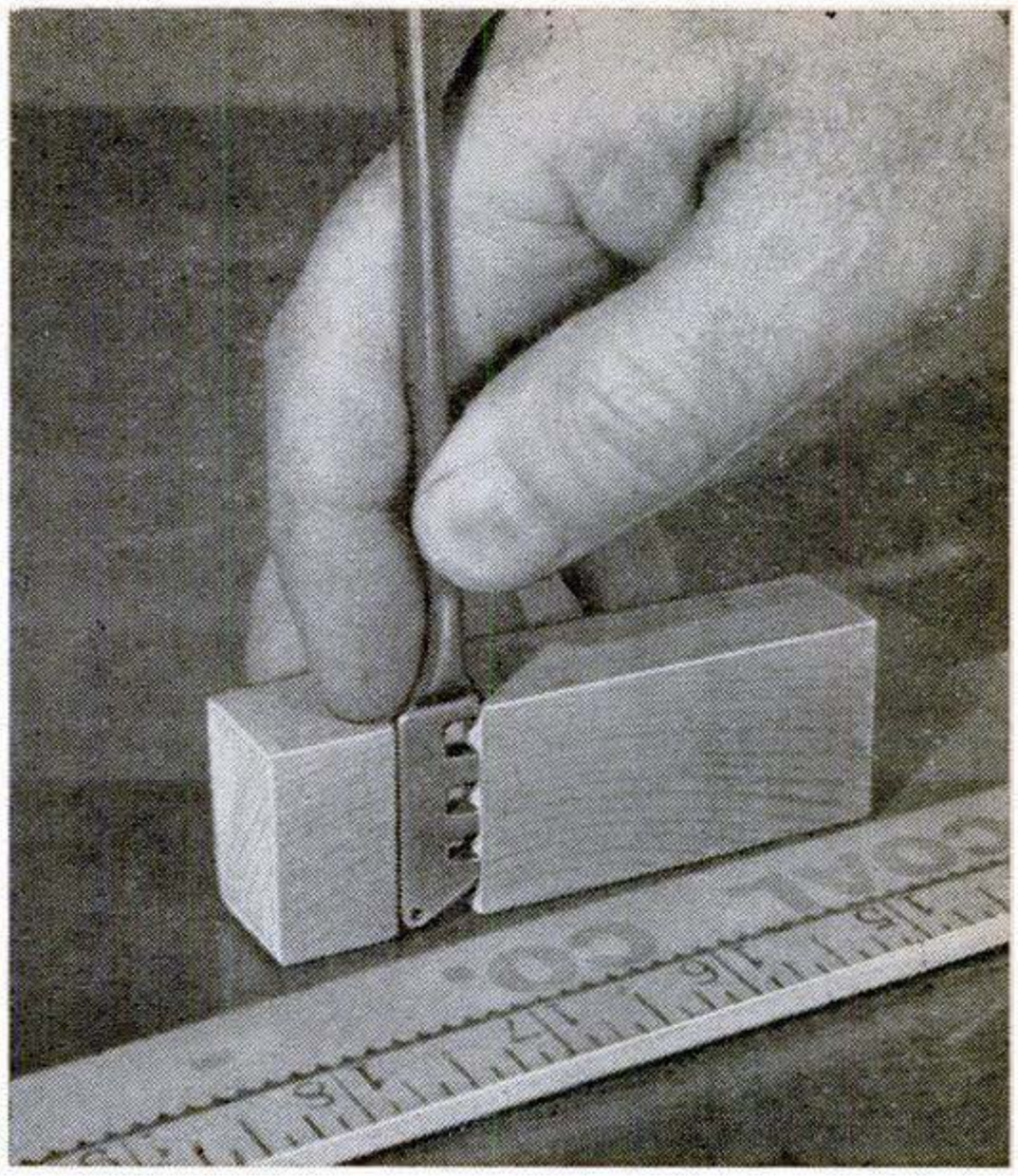
Copyrighted material



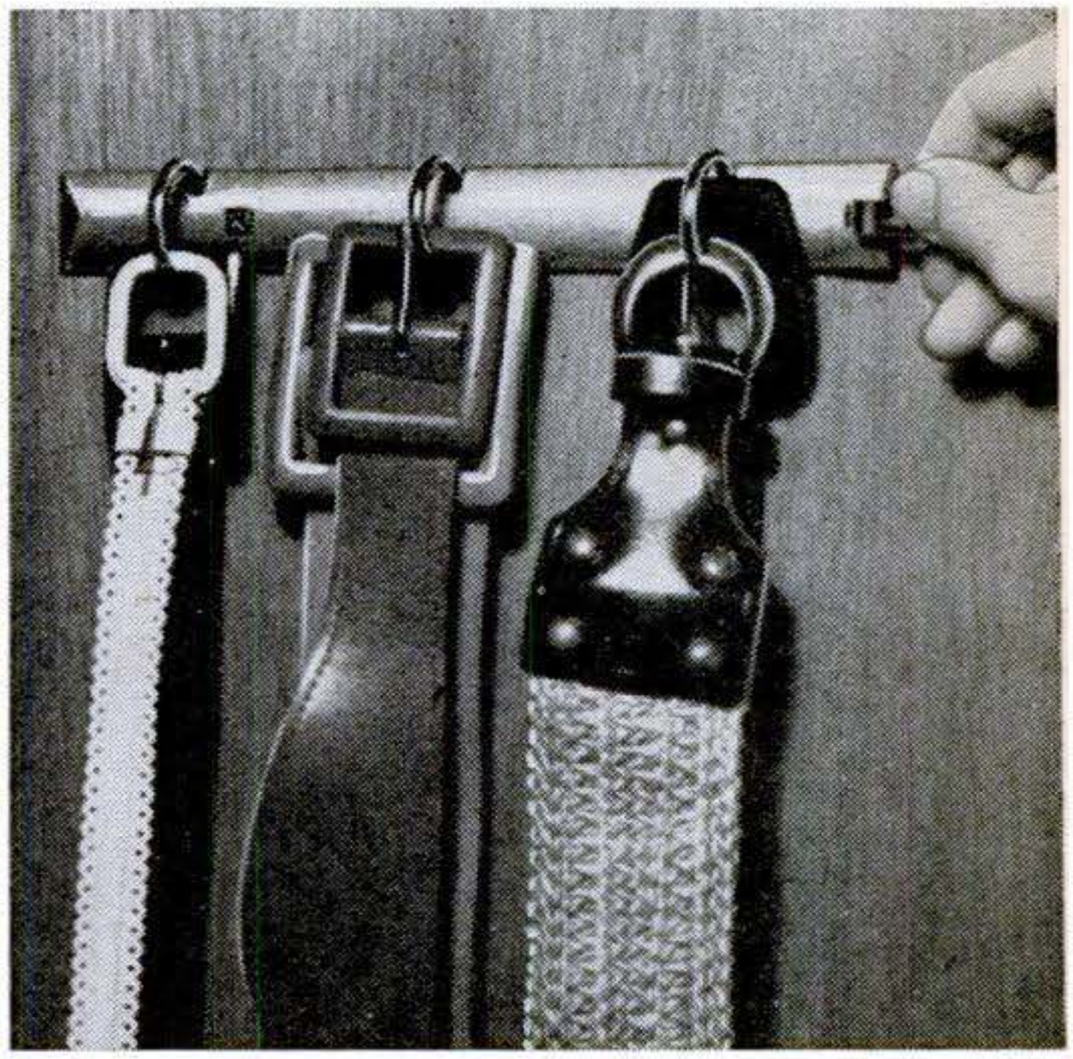



**GROOVE EACH JOINT** between wedges to take an inlay strip, making two parallel cuts a little under $\frac{1}{16}$" deep. The bolt clamp's top block (hidden by saw blade here) serves as a guide.



## Jig Cuts Glass Accurately

A GLASS cutter must be held absolutely straight for best results, but this isn't easy to do by hand. A vertical slot sawed in the side of a small wood block will hold the cutter upright for you as you move it along the surface of the glass.—*Ken Murray, Colon, Mich.*



## Old Ring Binder Holds Belts

THE metal ring section from an old notebook makes a perfect holder for belts. Remove the rivets and screw the binder to the back of a closet door. A push on the release tab opens all the rings so that any belt can be easily removed.—*Robert Micals, Freehold, N. J.*

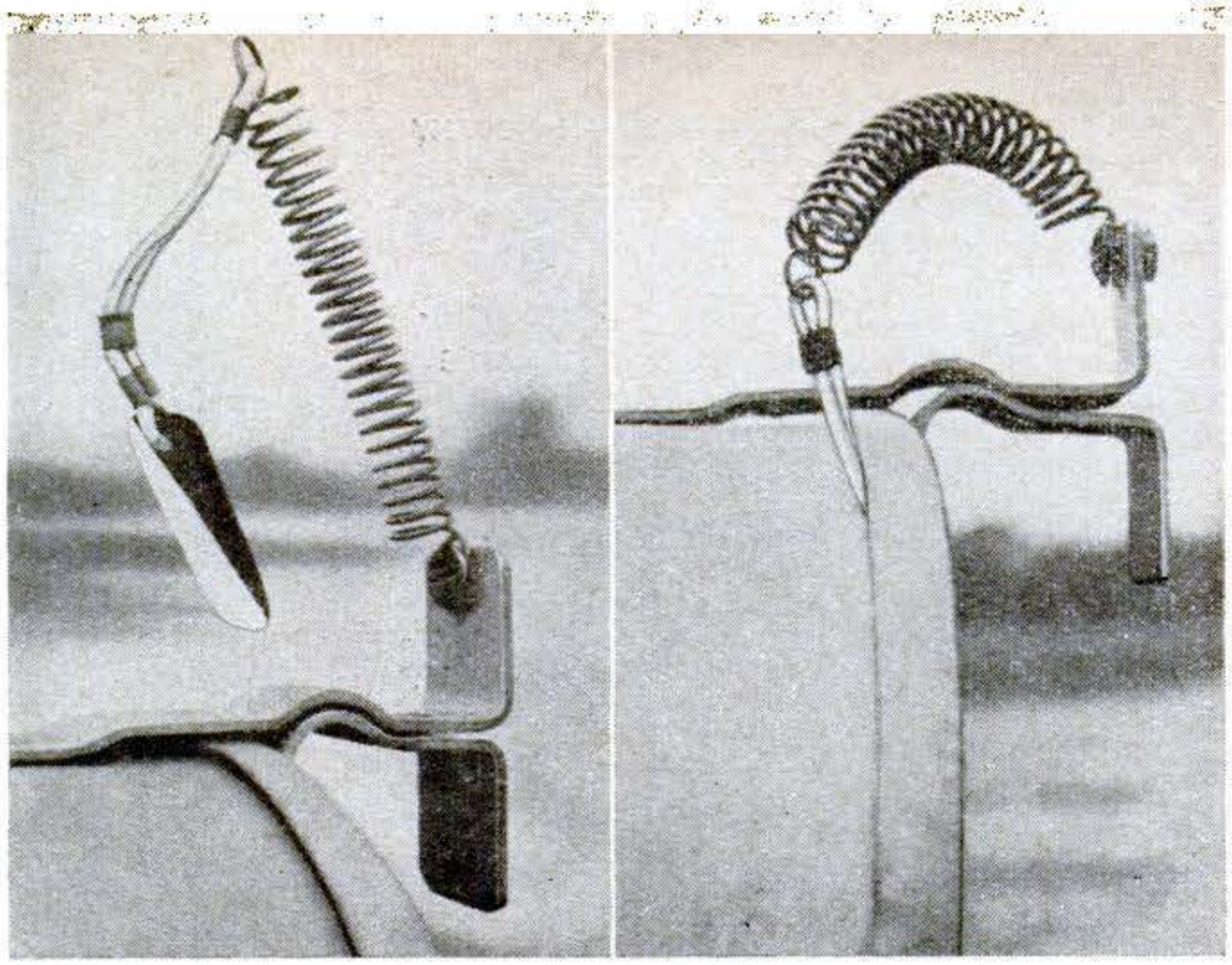


Copyrighted material

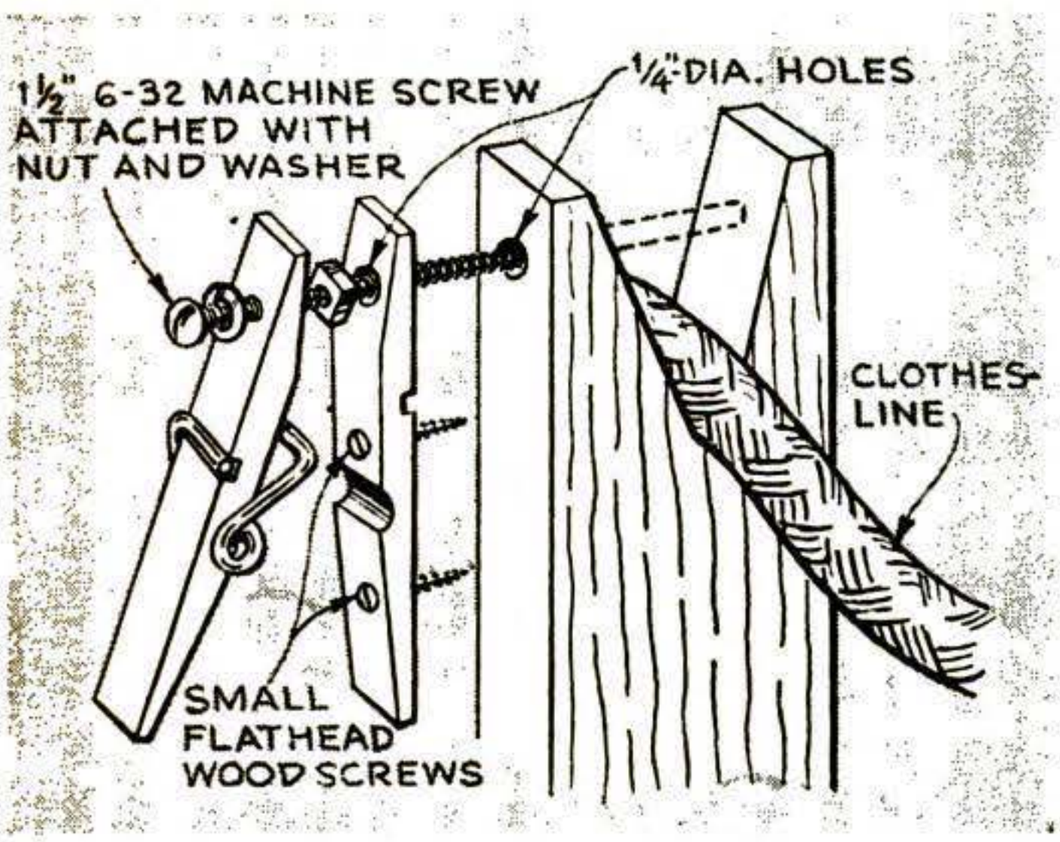
# Short Cuts and Tips

FROM PS READERS

## Signal Saves Trip to Mailbox



THESE winter days, a glance out the window tells me whether a trip to my mailbox is worthwhile. The signal is a brightly painted metal tag attached to one end of a 4″ coil spring. The other end is bolted on the top of the door catch. Each time I collect the mail, I tuck the tag inside. When the mailman opens the door, the tag pops to attention and beckons me from the fireside.—*Joseph R. Noonan, Burlington, Vt.*



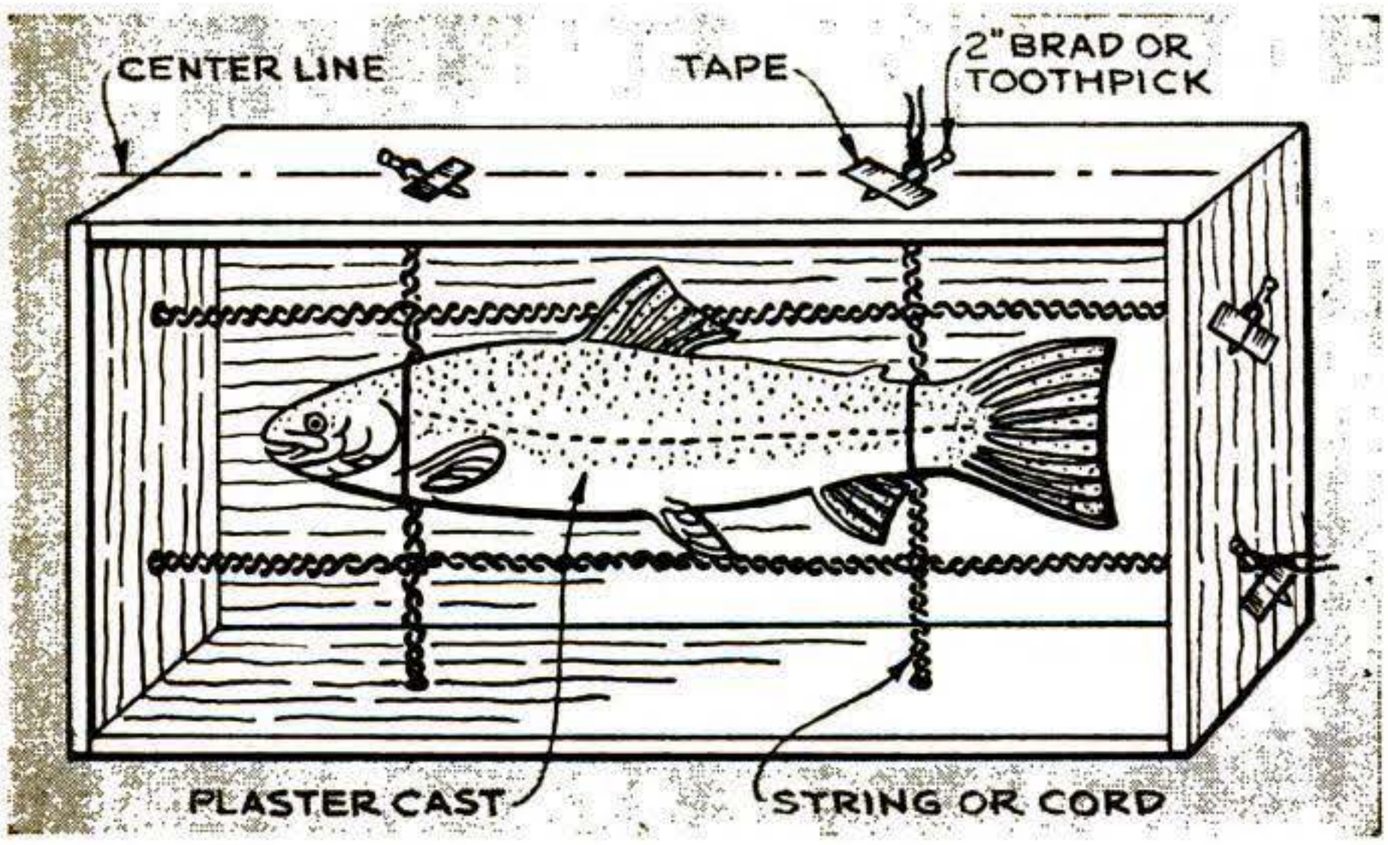

## Clip-On Clothesline Pole

WHEN my wife had to re-do a wash because the clothesline blew up out of its notched prop, *she* blew up, too. I calmed her by fixing the prop so it would lock onto the line yet be easy to remove for repositioning. A spring clothespin keeps a bolt across the notch until you press on the free leg. Take the clothespin apart and screw one leg to the side of the pole. Drill a hole through the jaw and on into the notch. Fasten a machine screw through the other jaw before reassembly.—*Lewis Johnson, Oceanside, N.Y.*

## Ship Breakable Items in a Web

SUSPENSION packing has taken many of my plaster casts of fish safely through the mails. It will work for any fragile item that's too irregular for solid padding, or is so tiny that it might be lost in a tumble of excelsior.

Find a sturdy box, larger in each dimension than the item to be shipped. Draw a center line around the four sides and punch holes opposite one another. Cut two pieces of cord long enough to cross the width of the box when doubled, with enough spare loop to hold the article. Insert a pin through the end loop on one side and beneath the knot on the other, and twist against the article from both directions. The two horizontal strings are woven through the verticals to form a web that holds the object firm.—*Dr. P. C. Laporte, Edmundson, N. B.*

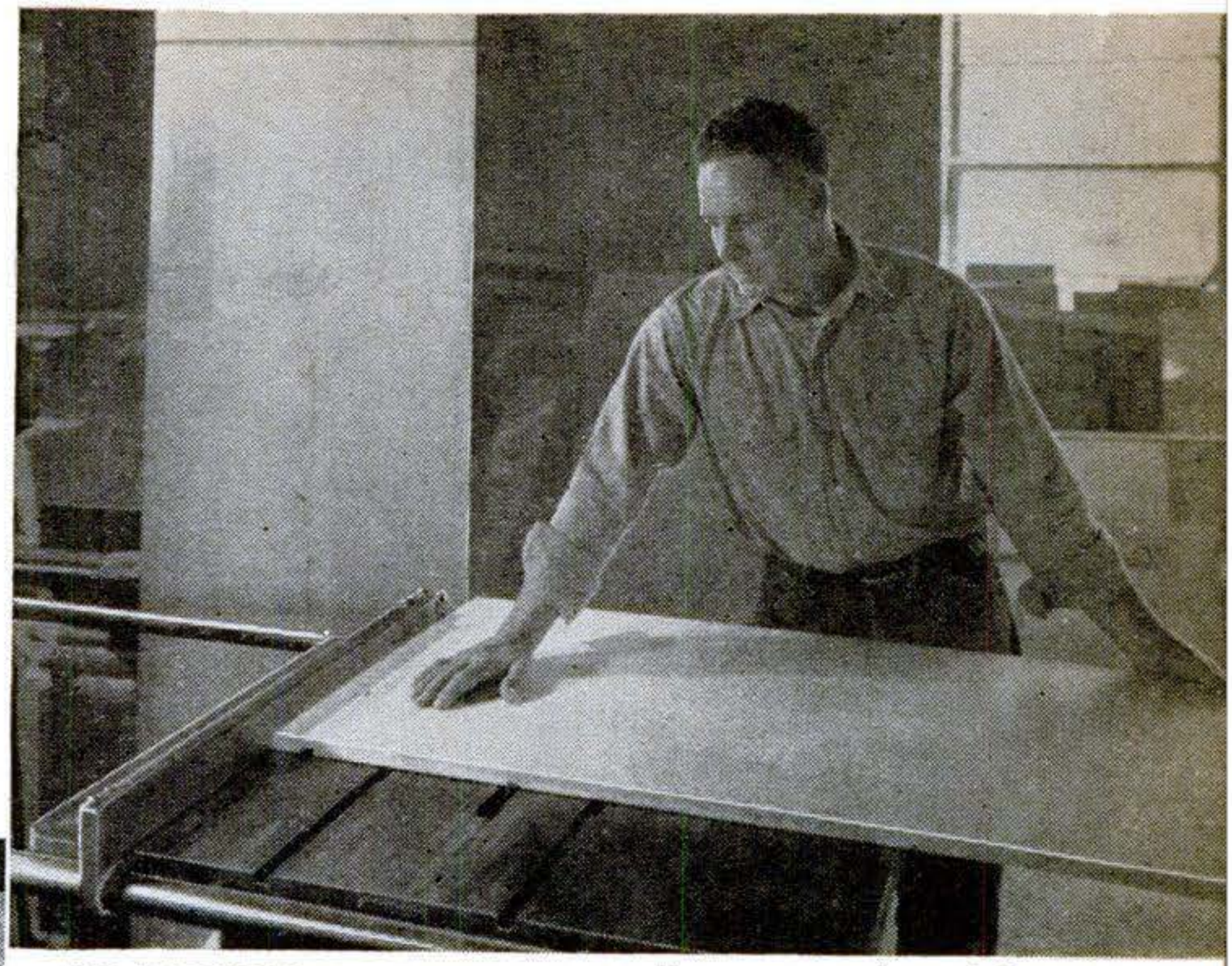


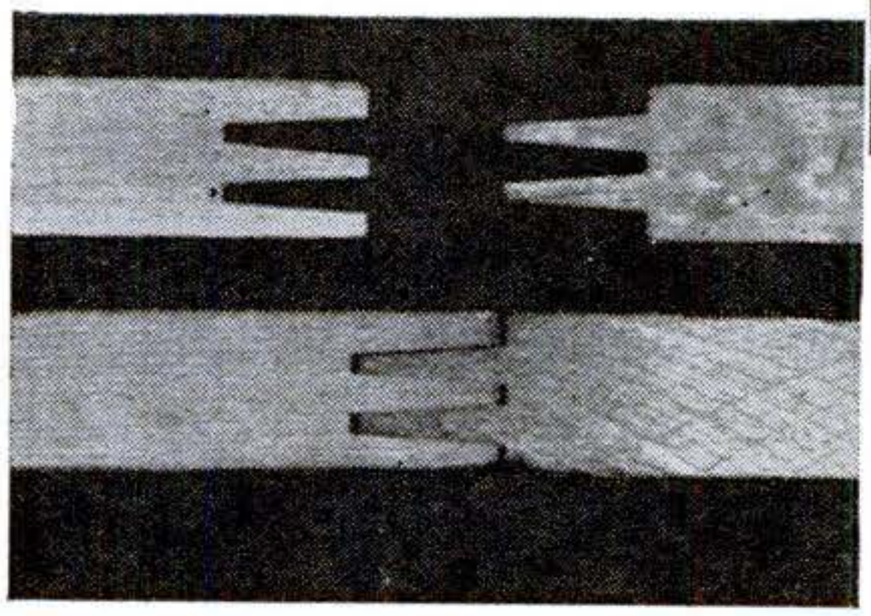



Copyrighted material

materials file

# Solid Wood in Big Panels





**BIG PROJECTS ARE NO PROBLEM** when you work with large sheets of solid wood like these 2′-wide planks. Wood scraps are glued together with interlocking joints, as shown at left, to make the big one-piece panels.

THE big new panels of solid wood you'll soon be seeing may revolutionize woodworking practices in many shops. You'd do well to know what they're good for, how well they work, and how you can buy them.

Imagine what you could do with sheets of solid wood up to 24′ long and 54″ wide. That's what you get with a product aptly named Widewood. The giant boards are made by edge-gluing hundreds of small wood scraps—some as narrow as 2″—into big one-piece panels.

The result is a product that has advantages over both regular lumber and plywood. The boards won't warp, cup, or crack, even in the largest sizes, as will individual planks. Yet, being solid wood, they are easier to saw and shape than plywood, have no problem edges to conceal, and have a fine, straight grain that takes paint and natural finishes well.

***What's it good for?*** Widewood is ideal for cabinets, built-ins, furniture, and other large areas because it eliminates joints and gives you a smooth surface. Since it comes in a wide range of sizes, you can buy it to match the job with less waste.

You can nail or screw directly into the solid edges without the fastenings loosening, or you can leave edges exposed with no special treatment. Because the wood is stable and flat, it's also good for doors, counters, and table tops. There's no prominent grain to show through thin plastic counter coverings.

***How you buy it.*** Widewood is sold in all common lumber lengths up to 24′ and in widths (actual) of 12″, 16″, 18″, 24″, 36″, 48″, and 54″. Nominal thicknesses are 1″, 1¼″, and 1½″. Thicker slabs up to 4″ are available on special order.

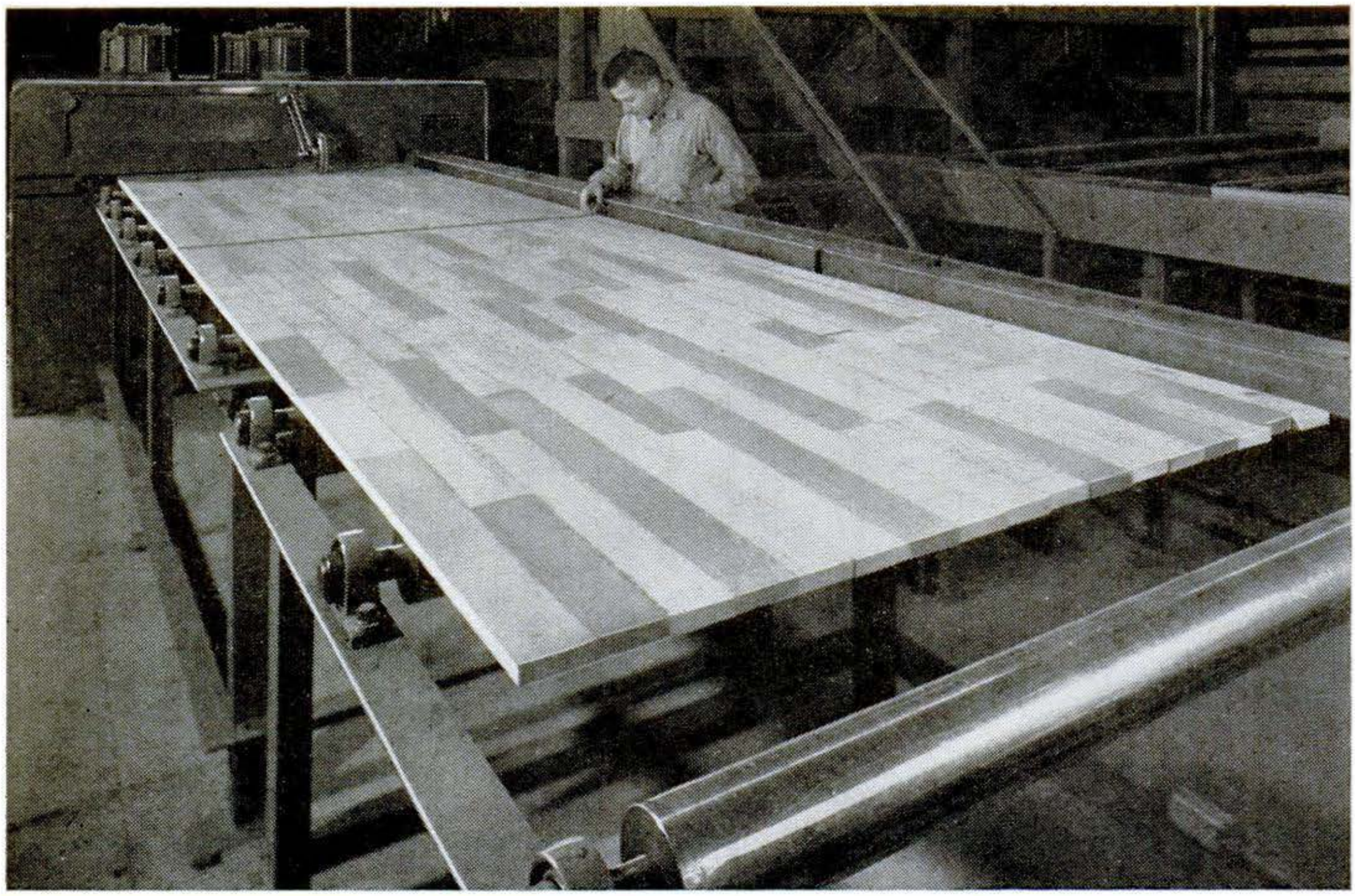
Widewood is made of ponderosa pine in three grades: Clear, which is B-grade lumber or better; Selected, which is No. 1 and No. 2 Common lumber; and Common, which is No. 3 and No. 4 Common. Clear grade, which is completely free of knots, sells for 50 cents a square foot in the 1″ (¾″ actual) thickness. Selected grade, which has small, tight knots, is about 27 cents a square foot in the same thickness; Common grade is still less.

At these prices, Selected grade Widewood is a little less than a comparable grade of plywood, and Clear grade is somewhat more. In Clear grade, however, you get the advantage of smooth, straight grain, which is easier to finish than rotary-cut plywood. In addition to pine, Widewood is also available on special

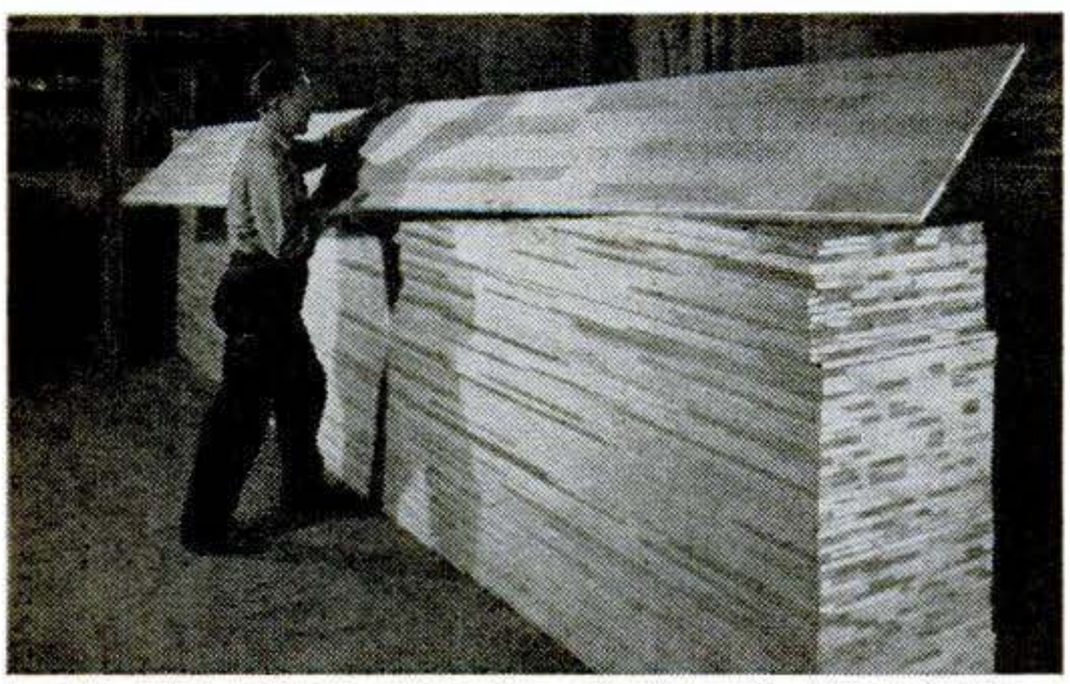
CONTINUED



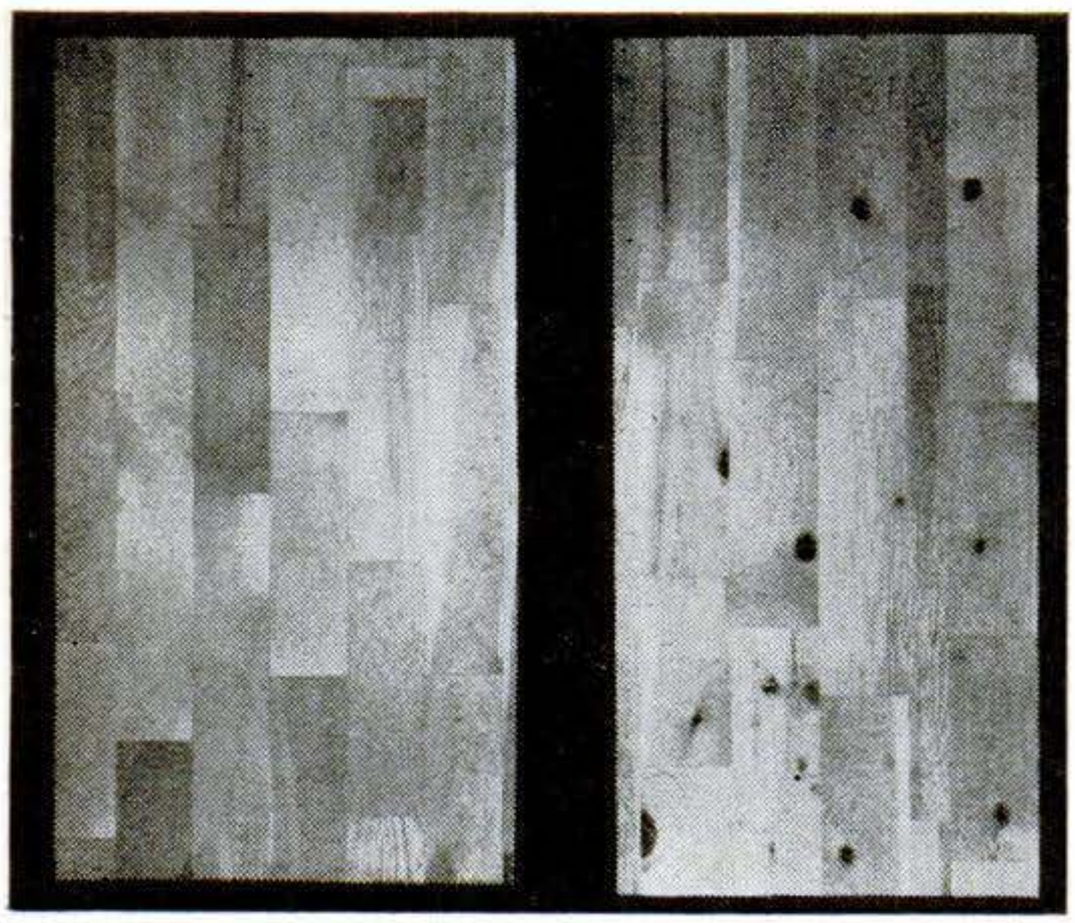
Copyrighted material



**THIS IS A SINGLE PANEL** 54" wide and 24' long, one of many supersizes of solid lumber made by assembling small wood scraps. It's shown here leaving the electronic gluing machine.



**IT LOOKS LIKE LUMBER**—but it's better for many uses. Glued-up panels won't warp or twist like boards. Edges need no special treatment.



**YOU GET CLEAN, STRAIGHT GRAIN** in the Clear grade above at left. The less-expensive Selected grade at right has small, tight knots.

order in Douglas fir, larch, or white fir.

***How it's made.*** The pine scraps in Widewood aren't just sweepings off the floor. They're selected from high-quality, slow-growth Oregon timber. The wood is first kiln-dried to make it shrinkproof and to eliminate stresses that later lead to warping, twisting, and cupping. It's this process, plus the combination of many small pieces, that make the panels flat and stable.

The scraps are held together by multi-fingered, interlocking joints at the ends and are electronically glue-welded under 3,000 pounds' pressure and high heat. The glue, a special blend of melamine and urea, is colorless, waterproof, and stronger than the wood itself.

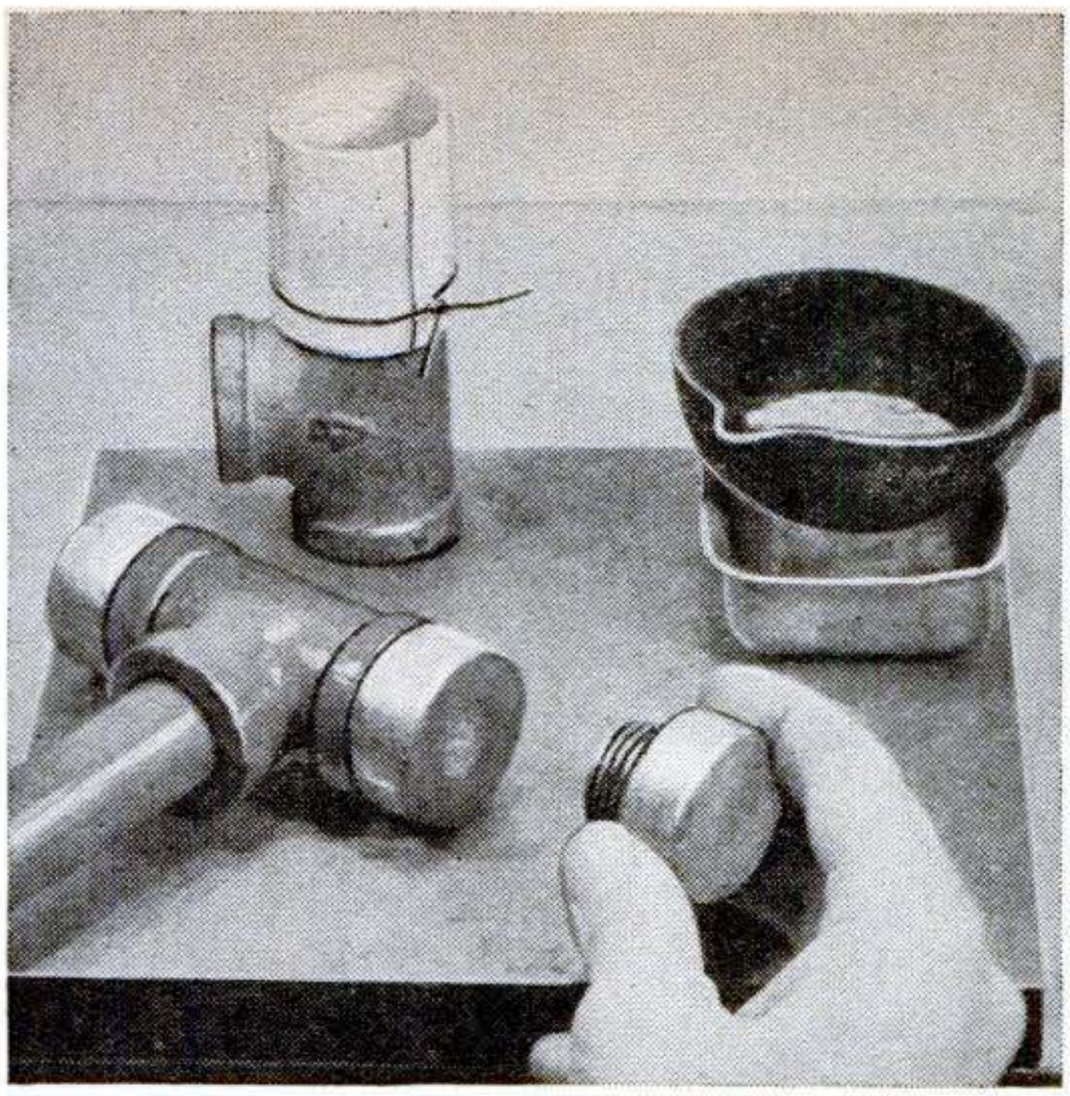
Widewood is made by the Edward Hines Lumber Co., 200 S. Michigan Ave., Chicago. It can be obtained at lumber yards in the East, South, and Midwest and will soon be available in the Far West. A few types of similar built-up lumber are being made by other companies, but these are now available only to builders and industrial users.



Copyrighted material

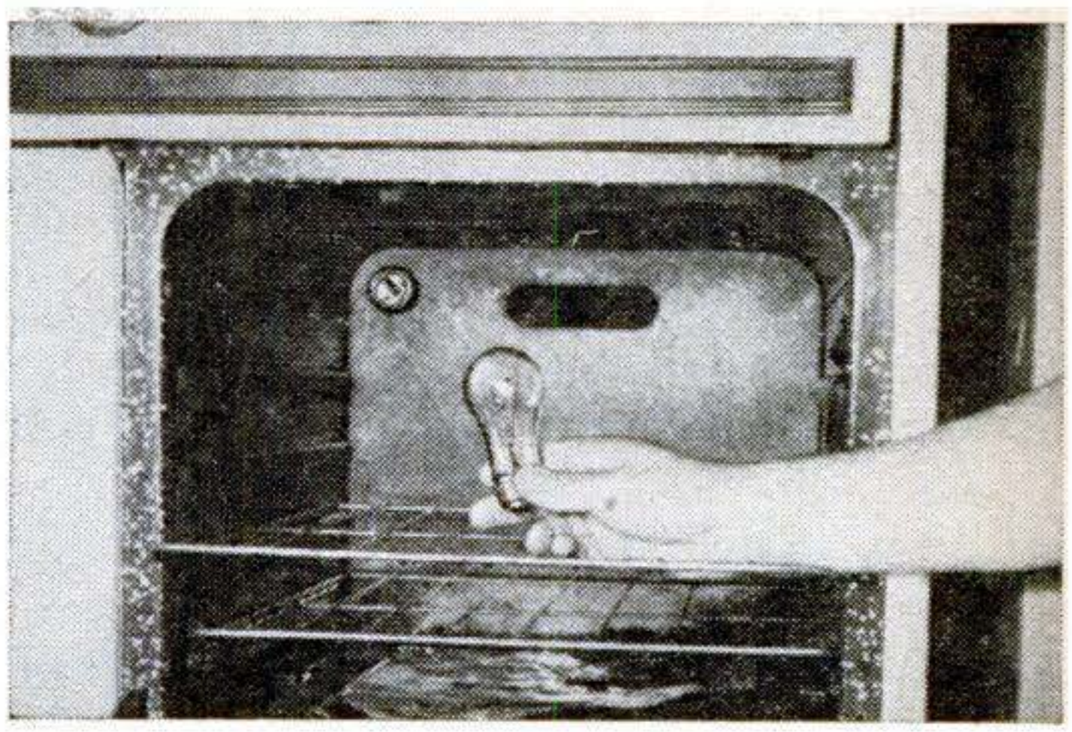
# Short Cuts and Tips

FROM PS READERS



## New Faces for a Lead Hammer

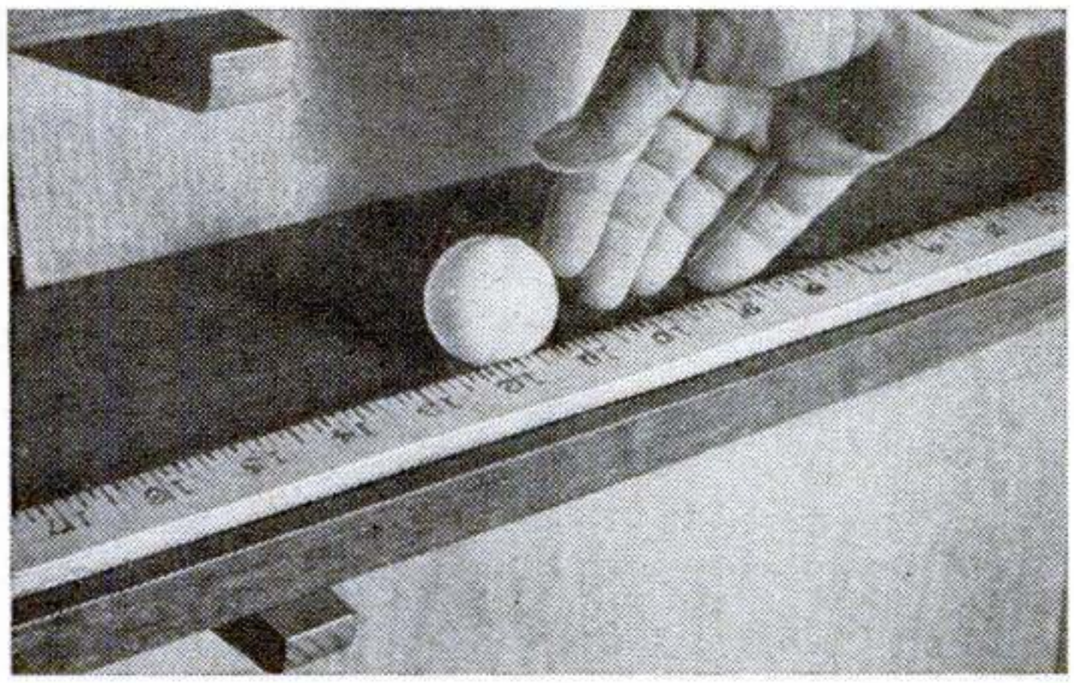
HERE'S a lead hammer that can be restored when the lead faces become worn. It's a pipe tee fitted with a handle. Replaceable faces are made by casting lead in another threaded fitting used as a mold. Pack the fitting with steel wool up to the threads and insert a disk of asbestos paper to hold in the lead. Wire a strip of asbestos around the outside of the fitting to form a cup and pour in molten lead. When cool, the lead faces can be unscrewed from the mold and screwed into the hammer as they're needed.—*Robert Micals, Freehold, N. J.*



## Replacing an Oven Light

IF THE light bulb in your oven burns out, replace it with one marked "range oven." These special bulbs are made of heat-resistant glass and are fastened at the base with high-temperature cement. An ordinary bulb will come apart or shatter when subjected to oven heat.—*Robert Hertzberg, Douglaston, N. Y.*

▶▶▶EXTRA handles for files and rasps can be salvaged from a child's worn-out jumping rope. Just cut the rope flush and drive the handle onto the tang.—*Arthur R. Tanner, Poughkeepsie, N. Y.*



# What Would You Do ?

**. . . with a shelf to put up and no level at hand**

A MARBLE or steel ball will serve as a makeshift level. Place it against a straightedge to keep it from rolling off, and adjust the shelf until the ball remains stationary. The same tip applies when you want to test for a level subfloor before laying down the finished flooring, or to check the floor of a house you're thinking of buying. In these cases, omit the straightedge.

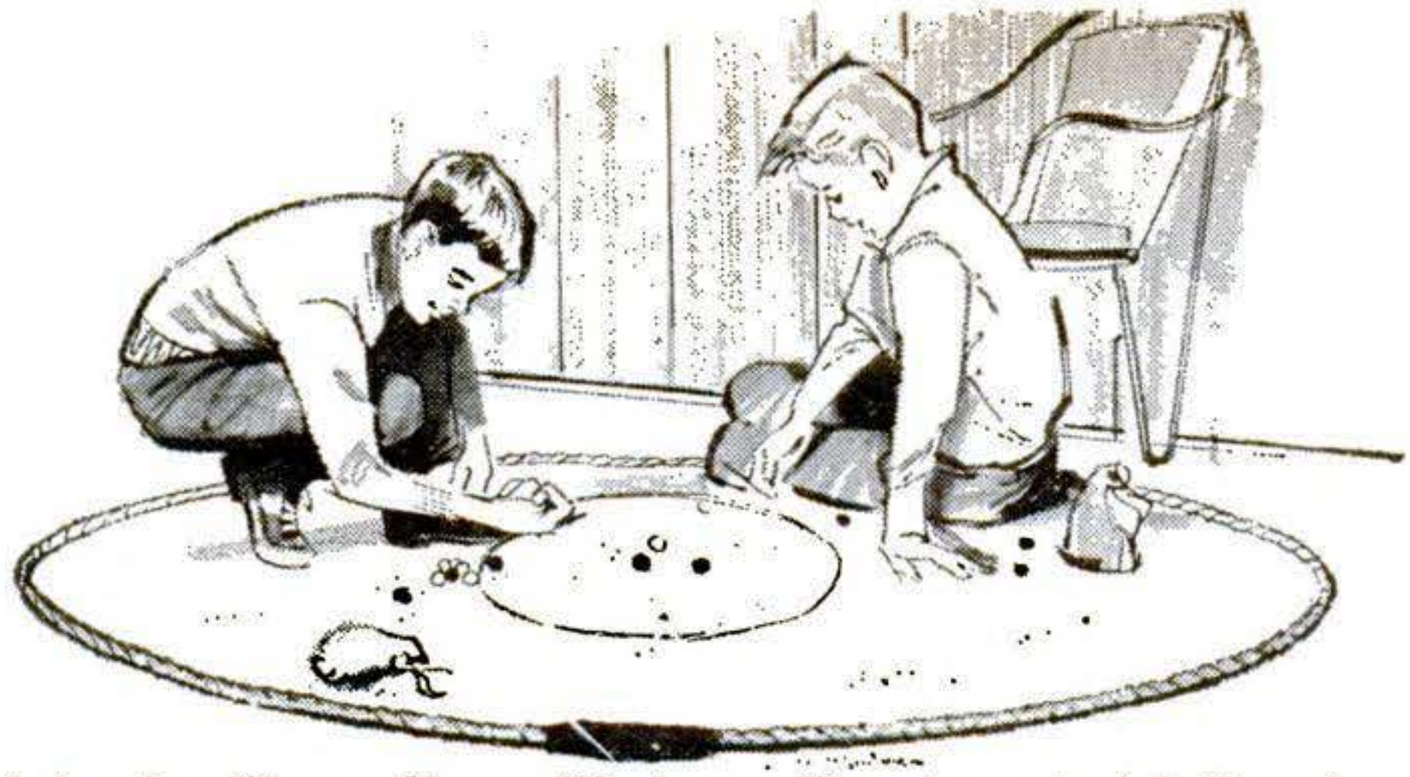
*Darrell Huff, Pacific Grove, Calif.*



Copyrighted material

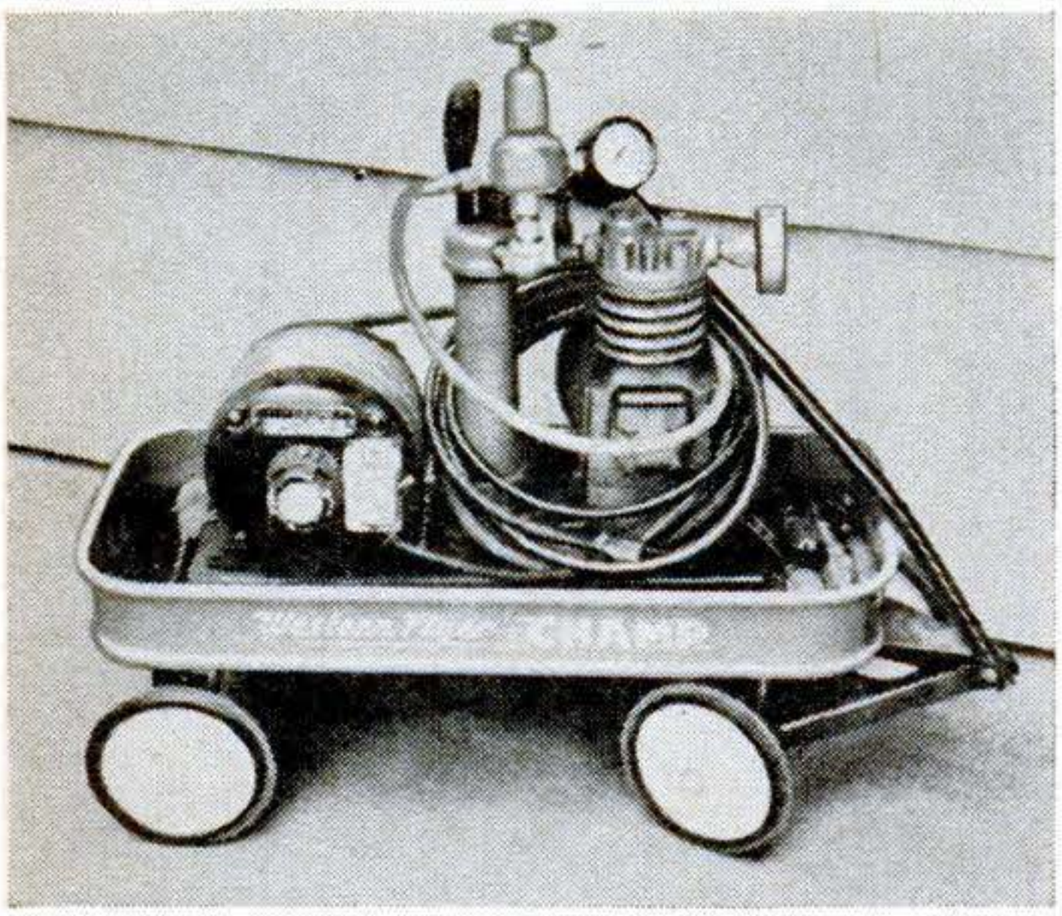
# Short Cuts and Tips

FROM PS READERS



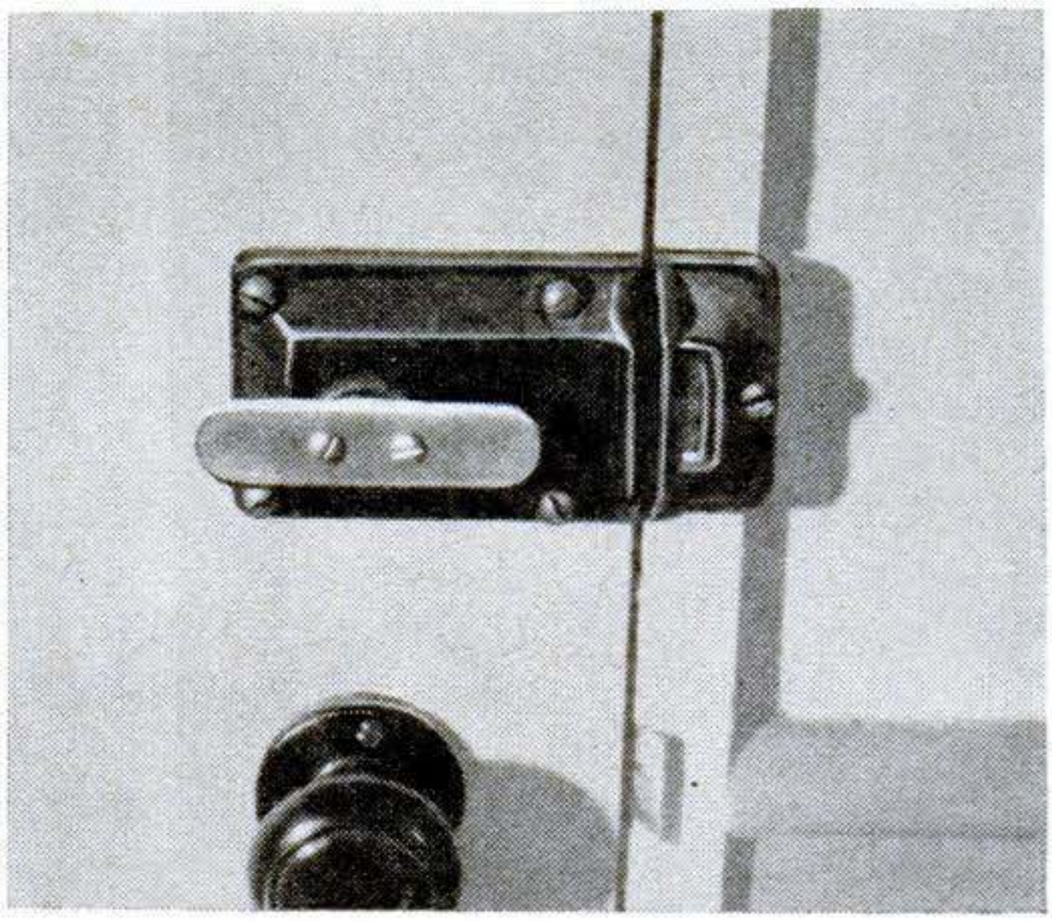
## Corral for Indoor Marble Game

WINTER days mean indoor play. The kids need an area for a game of marbles on the rug. A length of armored cable with the ends joined will fence it in to keep the marbles from straying. Clean the cable and cover the splice with tape. To store, twist the ring to form a figure eight and fold it double. —*J. E. Russo, Portsmouth, Va.*



## Wheels for a Compressor

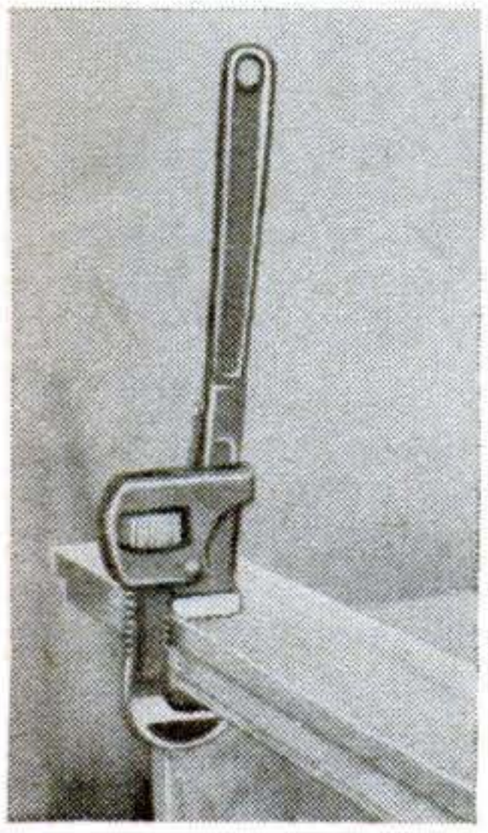
I MADE my spray compressor portable by mounting it in a child's wagon, after equipping it with a long heavy-duty cord. Compressor and motor are fastened to a wooden platform. Four bolts attach this unit to the wagon bed, leaving room for carting tools, too.—*O. G. Newby, Houston.*



## Bar Signal for Night Latch

OKAY, so I'm lazy. But I got tired of having to cross the room to check whether the back door was latched. By adding an aluminum bar to the knob, I made it easy to tell from a distance, come bedtime. When the latch is off, the bar is vertical.—*A. Walker, Hemet, Calif.*

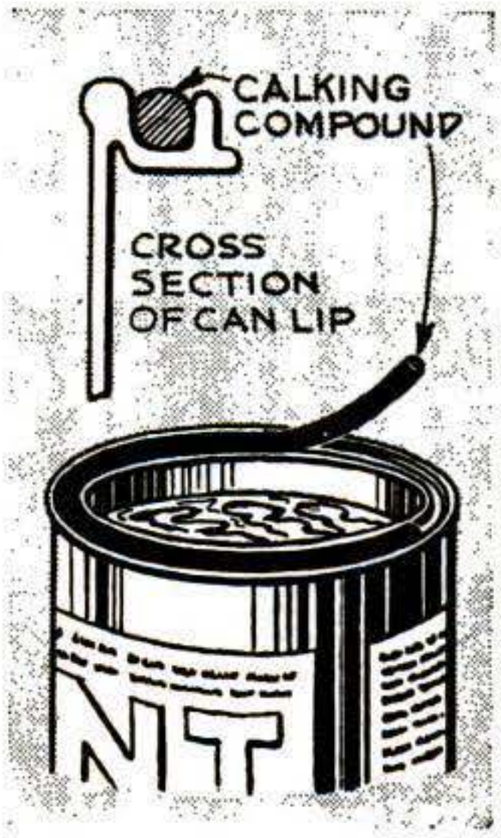
## Wrench is Substitute Clamp



I OWN a couple of big C clamps, but when I need them they always seem to be in use—or mislaid. Last time this happened, I clamped on a pipe wrench instead, padding the jaws with scrap blocks. Its jaws will handle many jobs.—*Jack Clark, Canary Islands, Spain.*

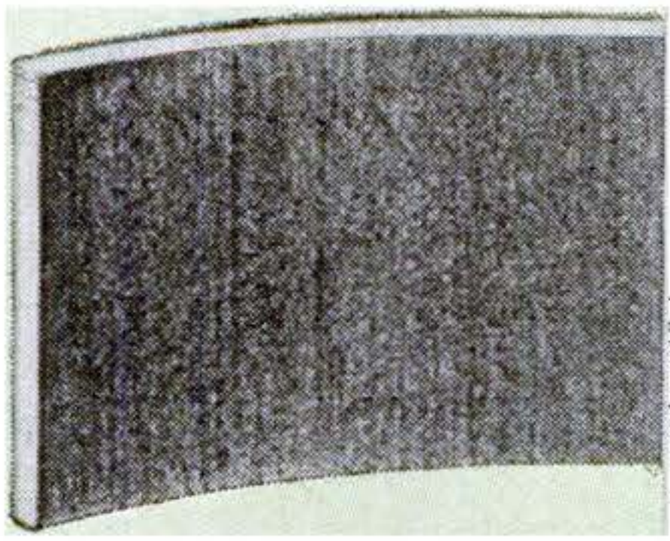
## Seal the Paint-Can Groove

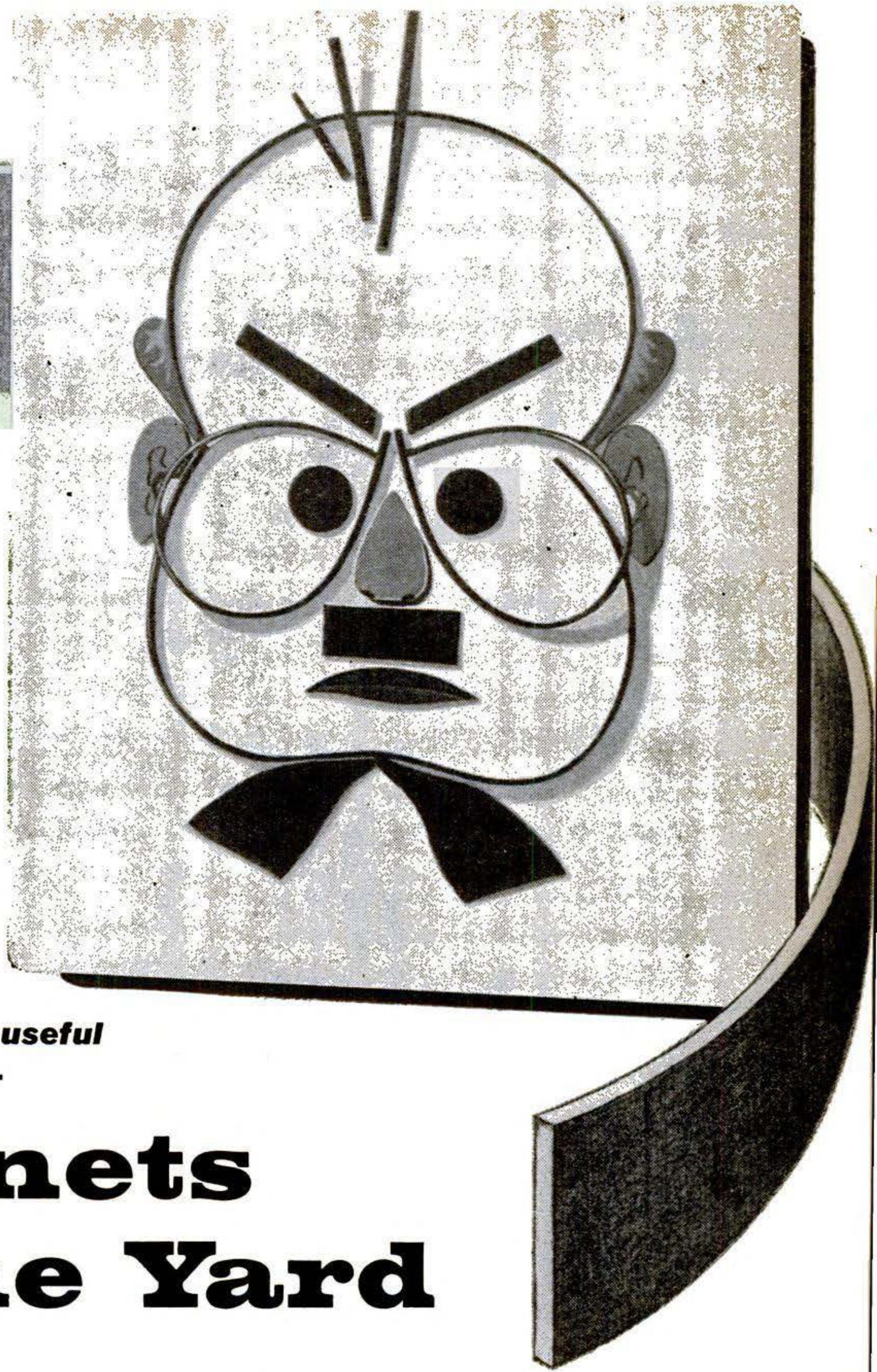
THAT groove around the top of a paint can is neat and clean when you first pry the lid off. You can keep it that way —and avoid the poor seal and the messy spatter when you replace the lid—by seating a rope of calking compound in it.—*Roger Samuels, Commack, N. Y.*






Copyrighted material





**ANYBODY CAN CARTOON** a thousand funny faces with bits of magnetized vinyl tape on a sheet-iron board. It's only one use for an exciting new material. For more on this, turn the page.

***Wacky, weird, and useful things to do with—***

# Magnets by the Yard

**By Harry Walton**

SOMETHING new in magnetic materials is a dark-brown vinyl tape about $\frac{1}{16}''$ thick. When you pull one strip along on top of another, the top one bounces as though crossing invisible railroad tracks. If you slide it with finger pressure, it feels as if there are cogs between the two pieces.

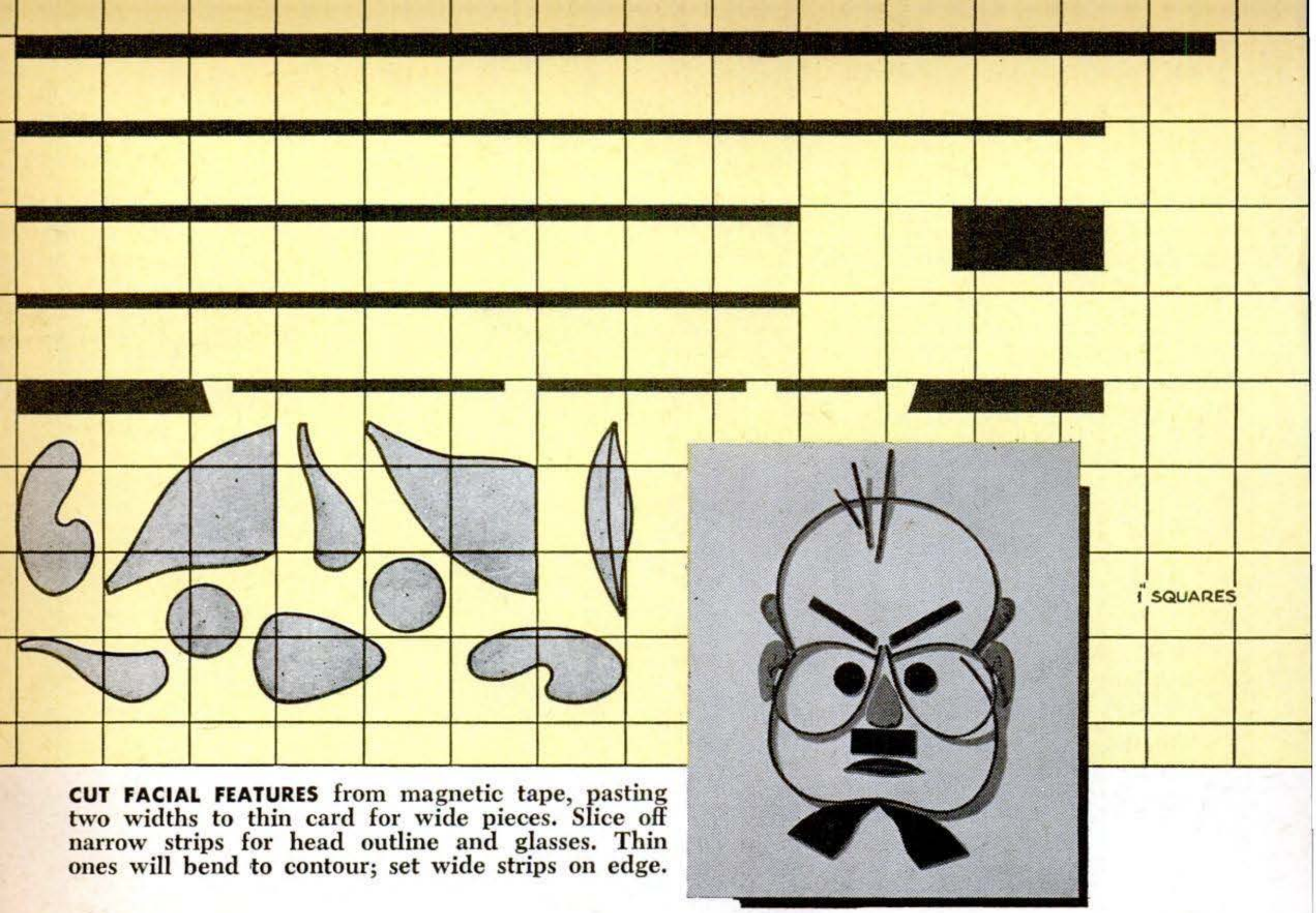
These cogs are parallel magnetic poles. The tape is loaded with magnetized particles. You buy the 1″ width by the roll —3′ for less than two dollars. You can cut it with a knife or scissors, bend it, paint it, attach it to just about anything.

Peel the protective cloth off the adhesive film, which is on the weaker magnetic face, and the tape will stick to paper, leather, wood, paint, or plastic, thus giving these surfaces a magnetic grip. For heavier duty, rub the adhesive

CONTINUED

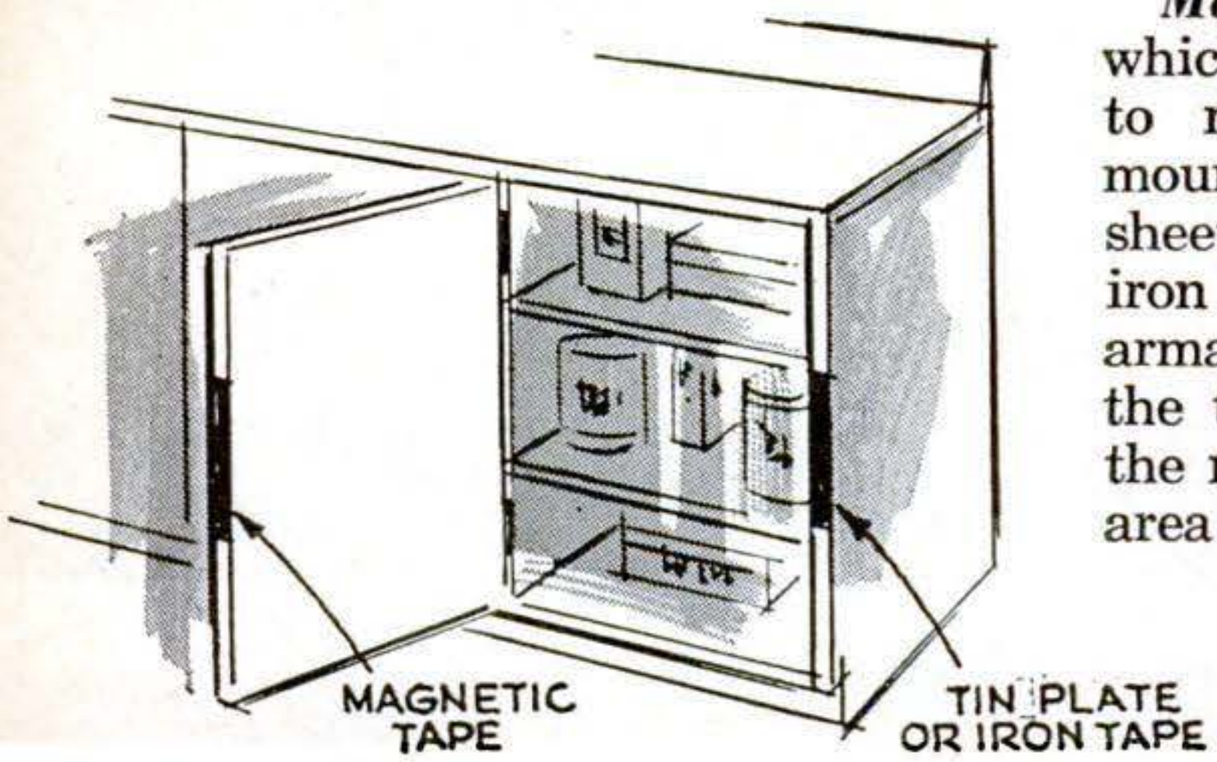


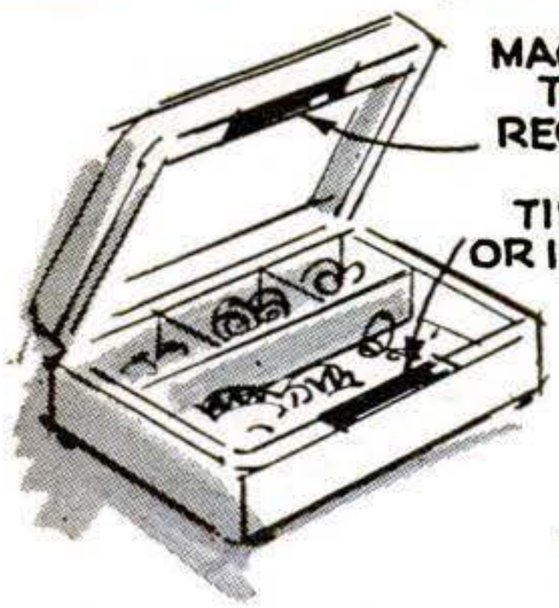
Copyrighted material



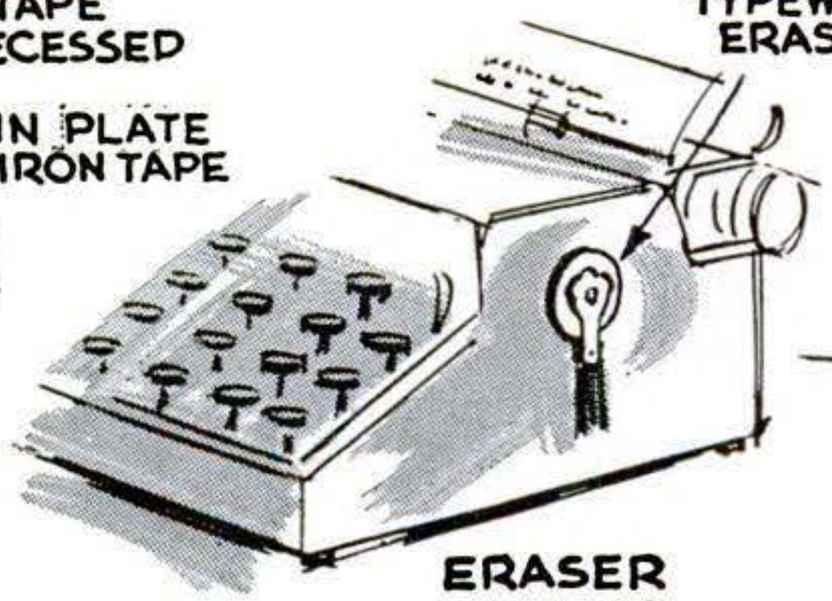

**CUT FACIAL FEATURES** from magnetic tape, pasting two widths to thin card for wide pieces. Slice off narrow strips for head outline and glasses. Thin ones will bend to contour; set wide strips on edge.

## *10 ways to use magnetic tape in the home, shop, and car*



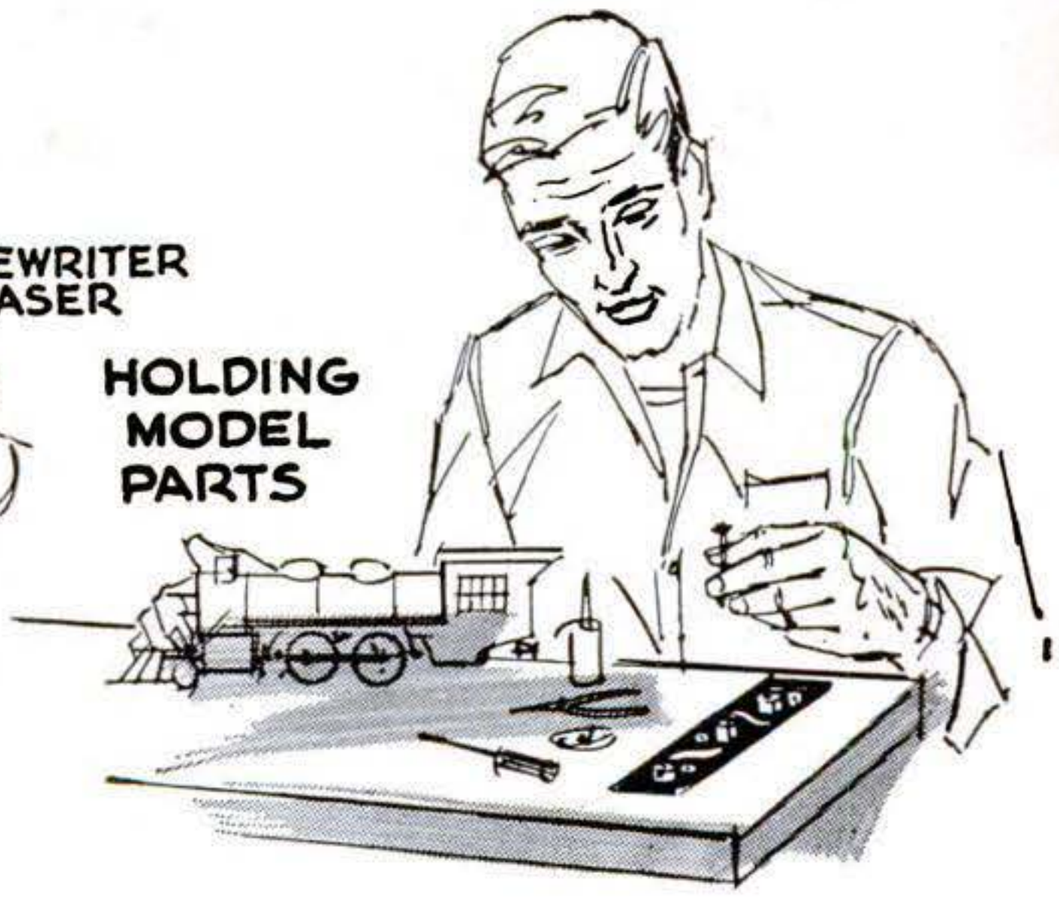

LATCHES AND CLOSURES




ERASER HOLDER

backing off with the fingers, roughen the tape with sandpaper, and stick it on with any modern cement.

***Making it cling.*** To make objects to which the tape has been attached cling to non-iron surfaces, you need only mount a magnetic armature on these—sheet iron, tin plate, or a new plastic-and-iron foil with adhesive backing. This armature should be of the same area as the tape. Countersink the screws or set the nails holding it, to leave the contact area as flat as possible.






Copyrighted material

For stronger magnetic attraction in a given area, double the tape. Cement on a first layer, strong side out. Place a second one on top without cement, also strong side out, letting it slide into the position in which it clings tightly. Now mark or cut this piece to insure cementing it on in exactly this alignment. Use a thin coat of adhesive.

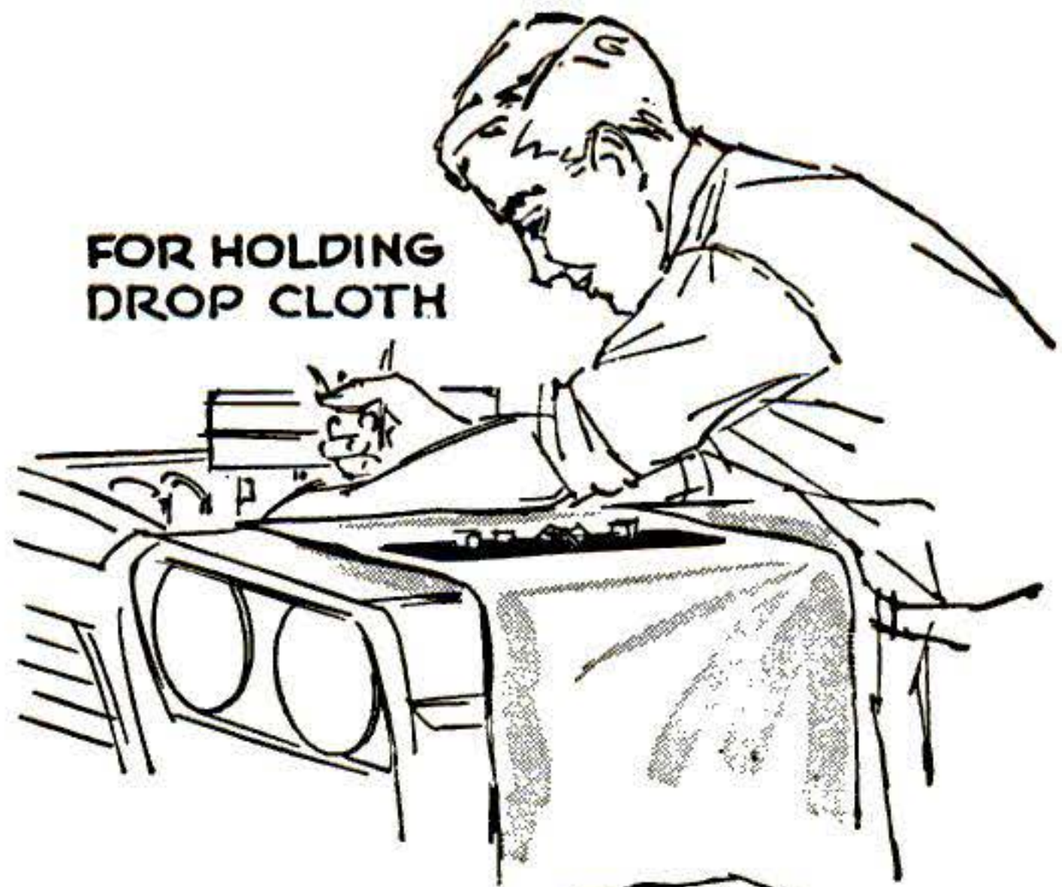
***Magnetic catches.*** For doors, use single tape thicknesses as long as needed; a 3″ piece will usually do. If a wooden door is warped, mount the catch on the corner that stands open, so holding the warp in. Neat closures for jewel and glove boxes can be made by recessing tape and armature and covering both thinly with paint.

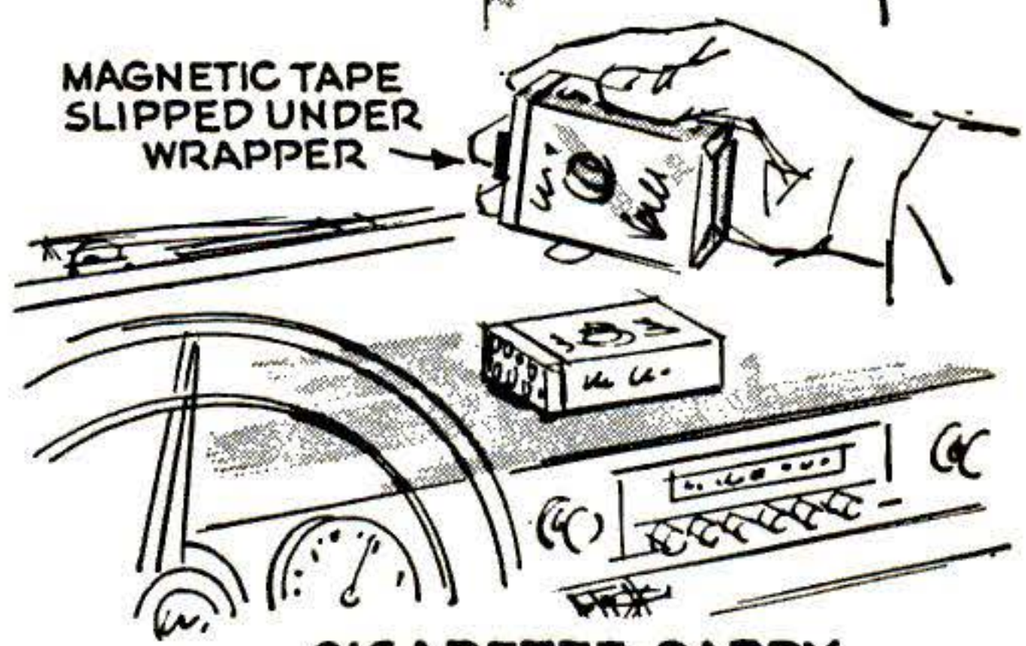
Small tools and gauges can be kept on a doubled strip of tape fastened to the workshop wall or bench backboard. Because of the pole arrangement, there seems little tendency to magnetize tools so held. Narrow strips will stay in any shape you place them on iron or tin plate. Charts, graphs, and map lines laid out this way are clear and permanent, yet readily shifted. Signs and markers painted on tape will stick to ferrous objects, sheet iron, or wire screening.

***For the car.*** Besides holding sun-glass cases and cigarettes on the dash, the tape can be laid in strategic spots to silence hood and door squeaks or seal rain leaks. It clings permanently, withstands heat and weather, conforms to curves. Don't bend it too sharply (it can break) or place it where sharp metal edges or corners can gouge it.

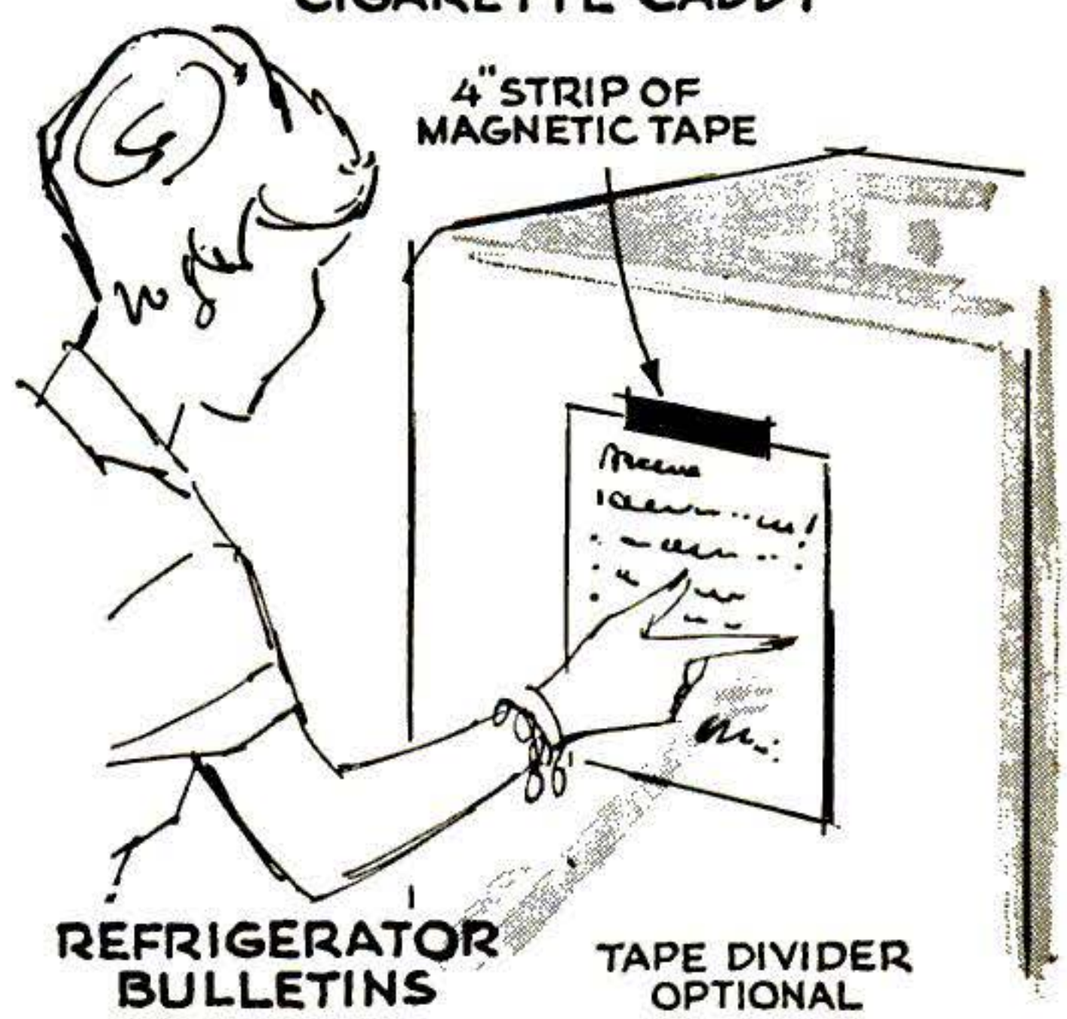
Stick a 2½″ strip to one face of a fine-grained plastic sponge to hold it on the dash. Cut razor slits in the upper face

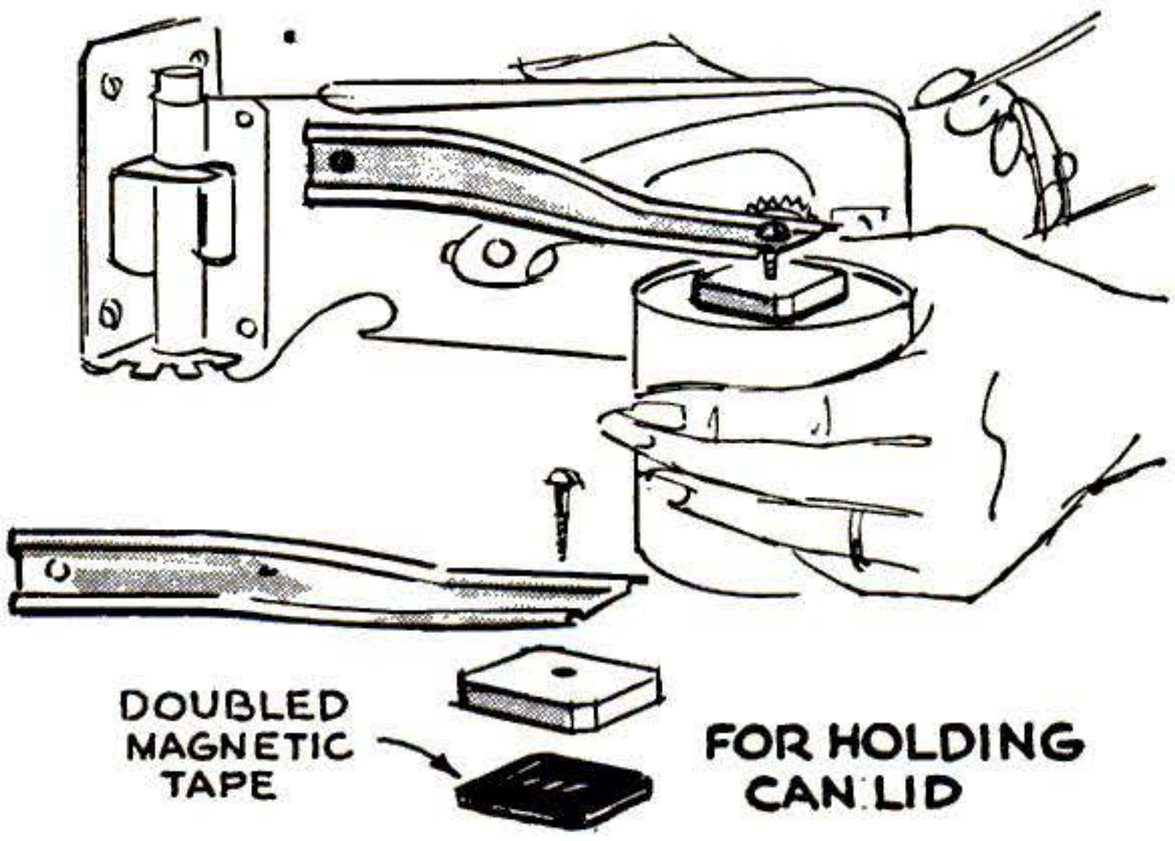
CONTINUED




CIGARETTE CADDY




FOR HOLDING
CAN LID

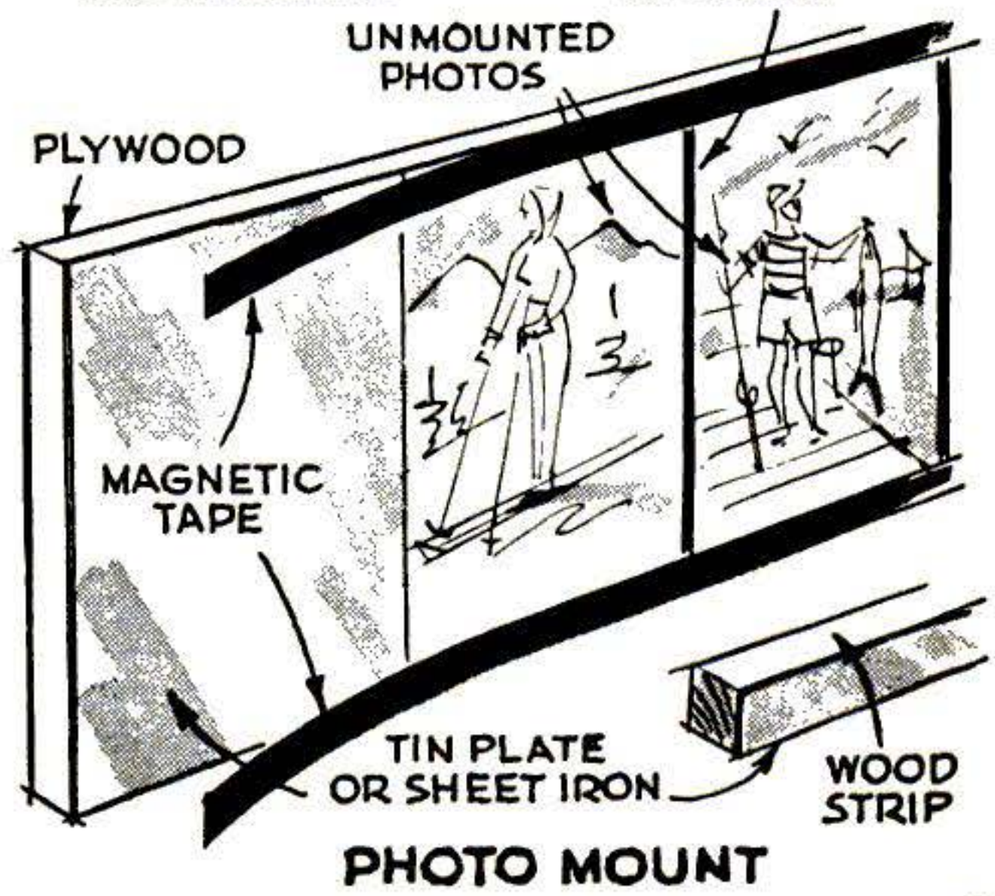
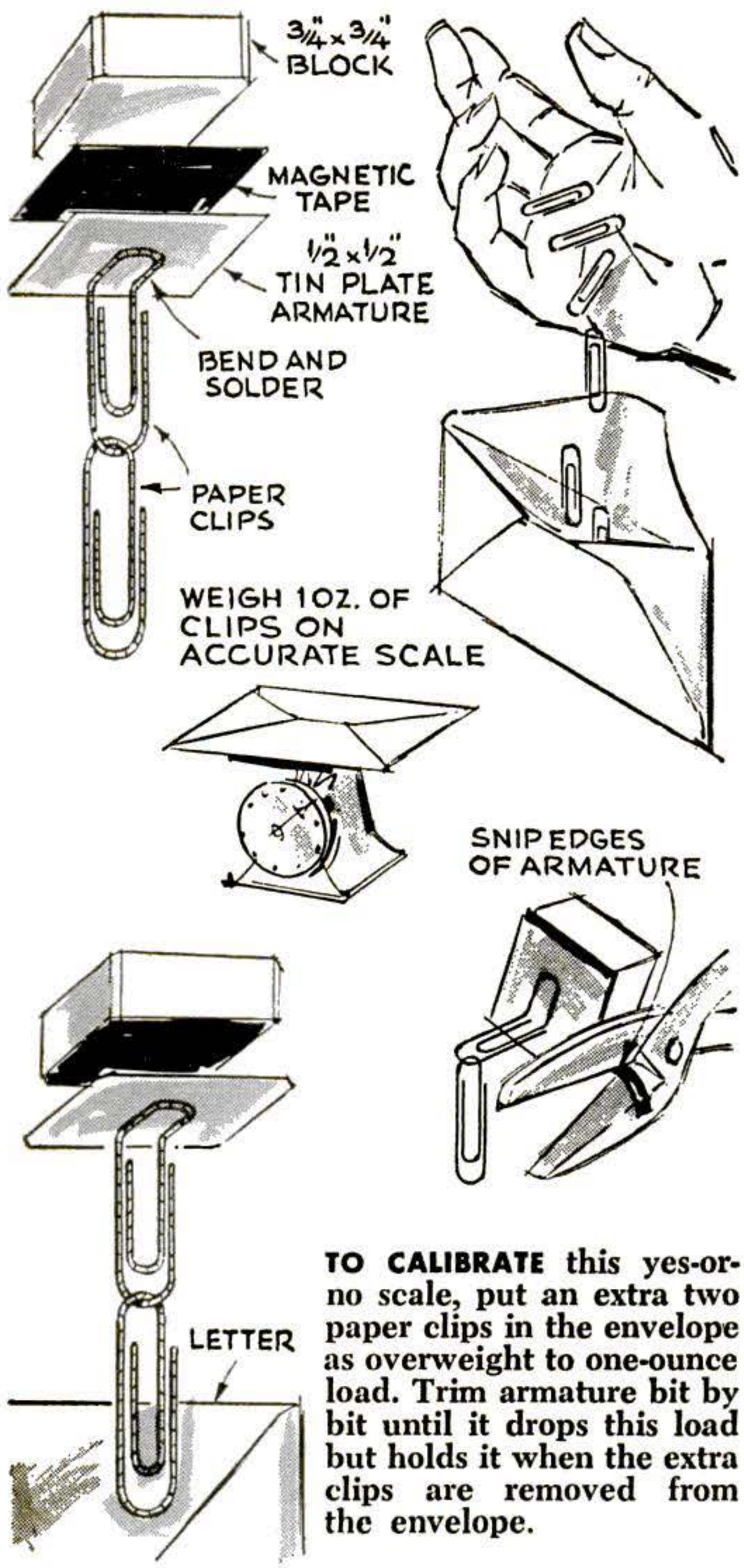



PHOTO MOUNT

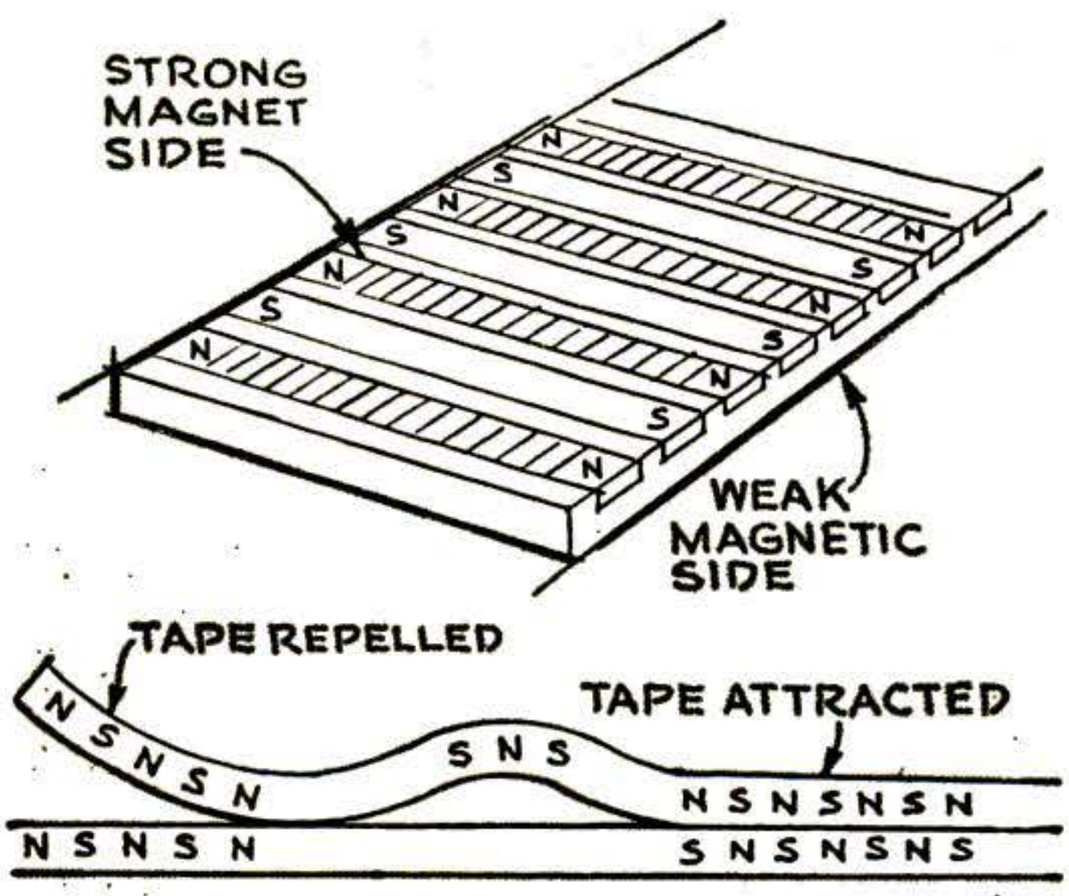


Copyrighted material

## Scale drops overweight letters




**TO CALIBRATE** this yes-or-no scale, put an extra two paper clips in the envelope as overweight to one-ounce load. Trim armature bit by bit until it drops this load but holds it when the extra clips are removed from the envelope.




**TAPE IS MAGNETIZED** crosswise, poles forming alternating bars as shown. If one piece is drawn along atop another with the strong faces together, upper strip flips up as like poles are aligned, flattens itself as unlike ones line up, producing an odd flip-flop bounce.

to hold coins for parking and tolls. A cloth with bits of tape along one edge will cling to the windshield frame, keep frost off the glass. The same simple dodge can be used to hold drop cloths against the fender or body when you're working on the car.

***Around the house.*** You can seal refrigerator-door leaks that hasten frosting. Find them by trying to pull out paper strips with the door closed. Place tape against the metal jamb to seal the gap. Drafts in steel casement windows can be stopped the same way.

Older wall can openers can be fitted with magnetic lid holders. Unframed photos mounted for display with strips of tape (which can be painted) are easily changed.

***Games are a challenge.*** Cement tape to the bottom of checkers and chessmen and they'll stay put on a tin-plate board. Scrap bits of tape will do. Cut out animal or people figures for children to maneuver on a painted iron board, or cut features for a gallery of funny faces.

A good toss game consists of a sheet-iron board ruled into squares—three or four to a side—and round magnetic disks. Cement tape to one side of milk-bottle tops or unbreakable poker chips. Tossed flat with a slight spin, they'll stick to the board.

For tic-tac-toe, each player throws until he lands on an unoccupied square. Disks that fall off, or land across a line or on an occupied square, don't count. First to get three in a row wins.

With rocket ships painted on the disks, you have a modern version of the old battleship game. A player owns any square he lands on, until his opponent hits the same square. The first ship is then "destroyed" and out of the game. The winner is the one who commands most squares when all disks have been played.

Invented in West Germany and made here by a major rubber company, Magnyl Tape is distributed by Applied Magnetics Corp., Leeds, Mass.



Copyrighted material

# ELMER'S WOOD-GLUING HANDBOOK

heavy construction • home improvements • cabinets and furniture • models and toys • sports equipment

COPYRIGHT © 1961, THE BORDEN COMPAN

Copyrighted material

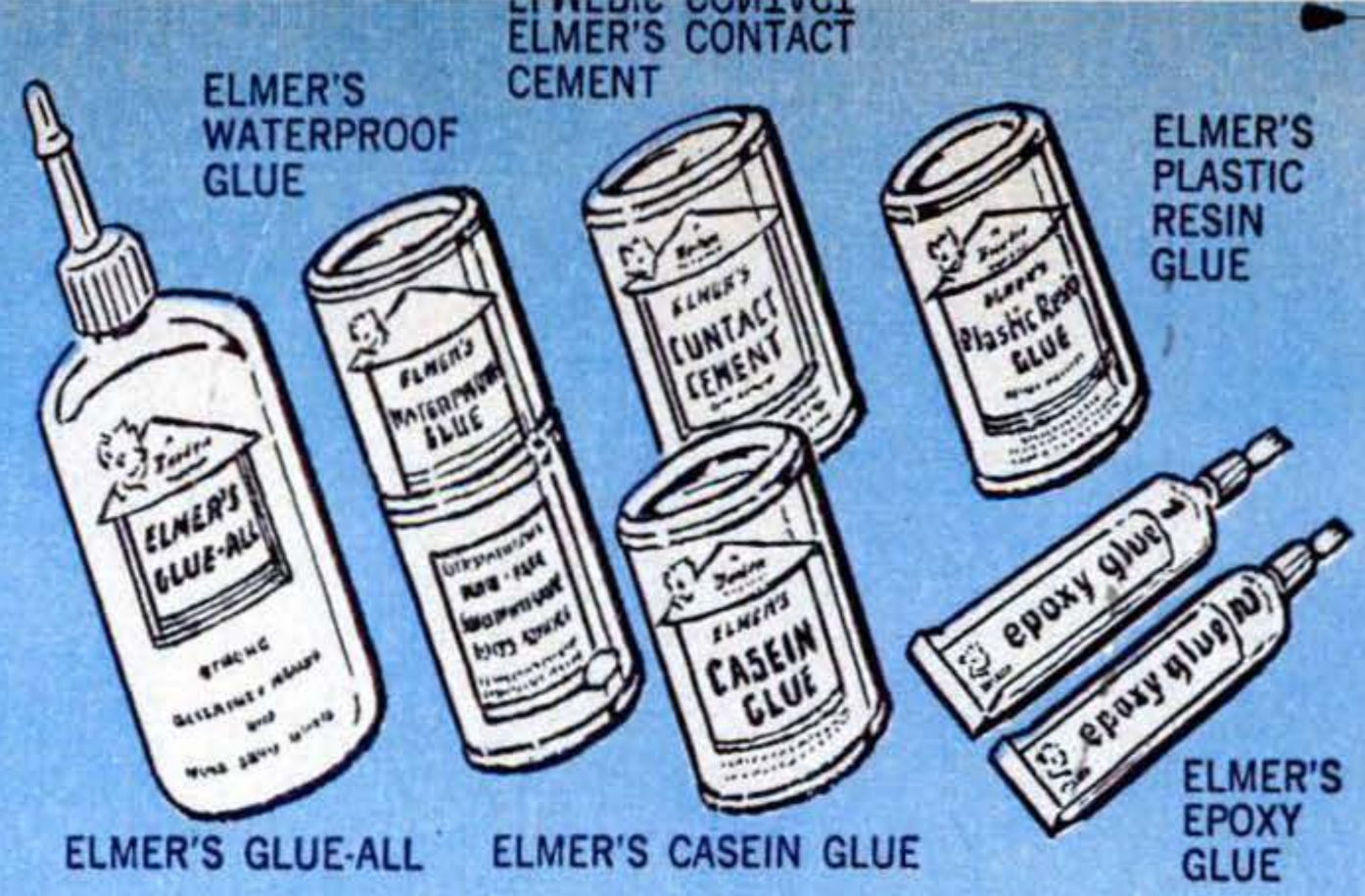
# Woodworker's gluing chart

| TYPE OF MATERIAL | GLUE FOR MAXIMUM STRENGTH WATERPROOF JOINT: (BOATS, EXTERIOR CONSTRUCTION, ETC.) | GLUE FOR LOW-COST WATER-RESISTANT JOINT (IN ORDER OF PREFERENCE) |
|---|---|---|
| All general gluing of hard and softwoods | Elmer's Waterproof Glue | Elmer's Plastic Resin Glue<br>Elmer's Casein Glue<br>Elmer's Glue-All |
| Particle and chip boards to wood | Elmer's Waterproof Glue | Elmer's Plastic Resin Glue<br>Elmer's Casein Glue<br>Elmer's Contact Cements<br>Elmer's Glue-All |
| Plywood to decorative plastic laminates | Elmer's Waterproof Glue | Elmer's Casein Glue<br>Elmer's Contact Cements<br>Elmer's Plastic Resin Glue |
| Laminating heavy framing members | Elmer's Waterproof Glue | Elmer's Casein Glue |
| Veneering, inlays, cabinetwork | Elmer's Plastic Resin Glue | Elmer's Plastic Resin Glue (extended)<br>Elmer's Glue-All (small jobs) |
| Bonding oily woods (teak, pitch pine, osage, yew, etc.) | Elmer's Waterproof Glue | Elmer's Casein Glue—sponge surface with dilute caustic soda one hour before gluing |
| End-wood joints, mitered joints, scarf joints | Elmer's Waterproof Glue | Elmer's Glue-All<br>Elmer's Plastic Resin Glue (heavy mix) |
| Loose-fitting joints, relatively rough surfaces | Elmer's Waterproof Glue | Elmer's Glue-All<br>Elmer's Casein Glue (heavy mix) |
| Doweling | Elmer's Waterproof Glue | Elmer's Plastic Resin Glue<br>Elmer's Glue-All |
| Hardboard to plywood, wood or itself | Elmer's Waterproof Glue | Elmer's Plastic Resin Glue<br>Elmer's Casein Glue<br>Elmer's Glue-All<br>Elmer's Contact Cements |
| Gluing porous materials—linoleum, canvas, etc. to wood | Elmer's Waterproof Glue | Elmer's Plastic Resin Glue<br>Elmer's Casein Glue<br>Elmer's Contact Cements |
| Gluing plastics, metal foil, etc. to wood | Elmer's Contact Cements | Elmer's Casein Glue (sand both surfaces) |
| Gluing hardware, boat fittings and other metal parts to wood | Elmer's Epoxy Glue | Elmer's Epoxy Glue |

**There's an ELMER'S Glue for every job you do.**

Copyrighted material

# What you should know about ELMER'S Glues




**ELMER'S** Glues and Cements are the finest adhesives you can buy. Each has been formulated to meet specific gluing needs. Choose the right ones and all of your woodworking projects will be as strong as modern chemistry can make them.

**ELMER'S GLUE-ALL.** A pure white polyvinyl acetate emulsion glue that dries fast, forming a transparent bond. Use it wherever waterproof joints aren't essential—for light house-interior construction and renovating work, furniture assembly and repair, toy and model making, and for joining such materials as cloth and leather to wood.

**ELMER'S PLASTIC RESIN GLUE.** A powdered urea resin product that you mix with water. It has a high degree of water resistance. Use it, as the pros do, for high-grade furniture construction. Apply it to clean, close-fitting surfaces. Cure, under pressure, for at least 10 hours at 70° F.

**ELMER'S WATERPROOF GLUE.** A two-component adhesive of liquid resorcin resin and powdered catalyst. Blended, they produce the strongest waterproof wood joints possible. Apply at 70° F. or over, and let cure for at least 10 hours under pressure.

**ELMER'S CASEIN GLUE.** A powdered casein product that mixes smoothly with water. It sets at much lower temperatures than other glues, and faster at normal room heat (only 3 hours at 70°). Because it's inexpensive, and has better-than-average filling qualities, it's fine for heavy wood gluing.

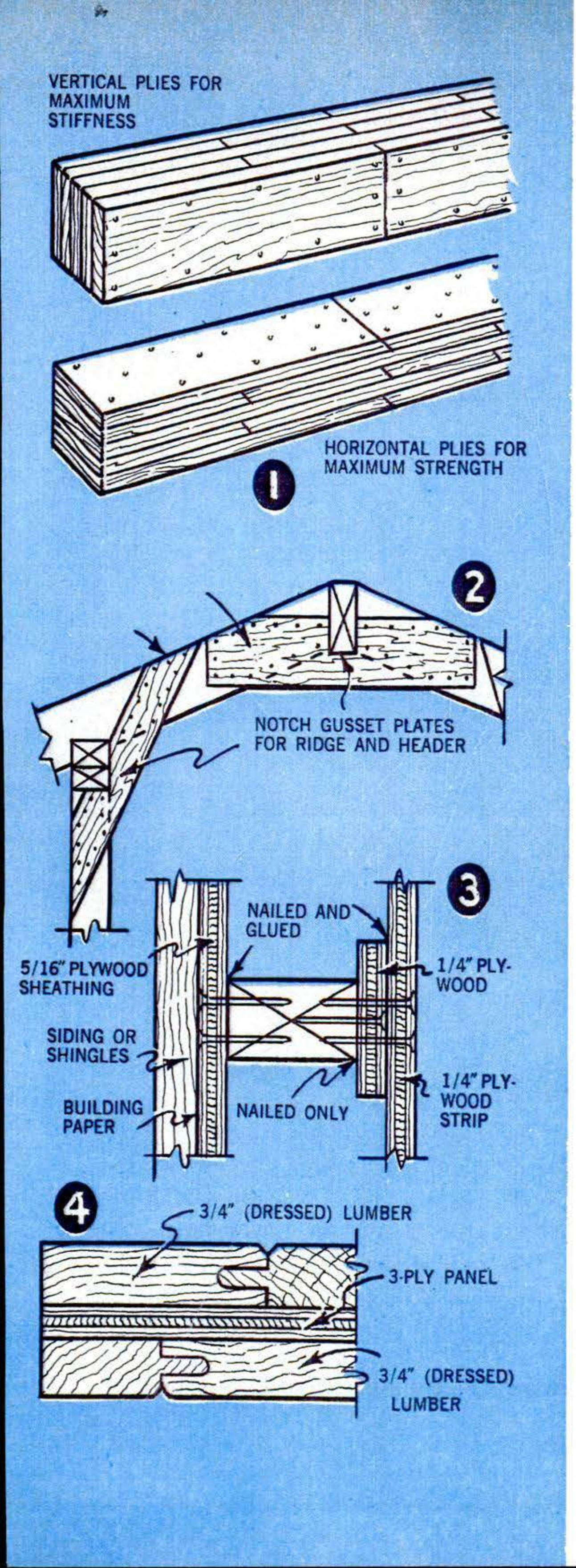
**ELMER'S CONTACT CEMENT.** Borden offers two types—*regular* and *non-flammable*. Completely non-staining. Ideal for applying wall paneling, and for covering counters, cabinets and table tops with both porous and non-porous surfacing materials ranging from linoleum and leather to plastic laminates.

**ELMER'S EPOXY GLUE.** The new wonder adhesive that's so strong it takes the place of riveting in many airplane assemblies. ELMER'S Epoxy Cement is a two-component team of adhesive and hardener. Squeeze out equal parts and blend with a knife. Use the mix for heretofore impossible jobs—among them, attaching wood to metal without unsightly fasteners.



Copyrighted material

# Heavy construction




**INDUSTRY** has developed exciting new construction techniques using wood, plywood and hardboard in conjunction with today's superior glues. You can apply the same methods when you build that new carport, patio, house trailer or dreamboat. Remember that nailed-and-glued joints are twice as strong as joints depending on nails or screws alone. Like a unitized car body, a glued structure eliminates slippage at joints, and possible loosening or shearing of mechanical fasteners. ELMER'S Casein, Plastic Resin and Waterproof Glues are your best possible bets for heavy construction. Make your choice from the chart on page 2.

**SUPER-STRENGTH BEAMS.** You may need these for columns, headers, and door and window lintels. Those formed of boards nailed and glued together are stronger and less likely to check than single timbers of equal size. Drawing 1 shows two ways of assembling the plies. When two or more boards are used for each ply, stagger the end joints. If you're working with horizontal plies, the board ends should be cut to mating diagonals, or "scarfs." With both methods of assembly, drive nails before the glue sets —one for each 5 square inches of joint area, plus additional nails at board ends.

**FRAMING.** Reinforcing plates, or "gussets," applied to stress areas in framing "beef up" construction greatly. Cut the gussets from ⅜-inch or thicker plywood, and bond them to other structural members with nails and glue. Typical installations – where rafters meet at a roof ridge, and are fastened to a wall header—are shown in drawing 2.



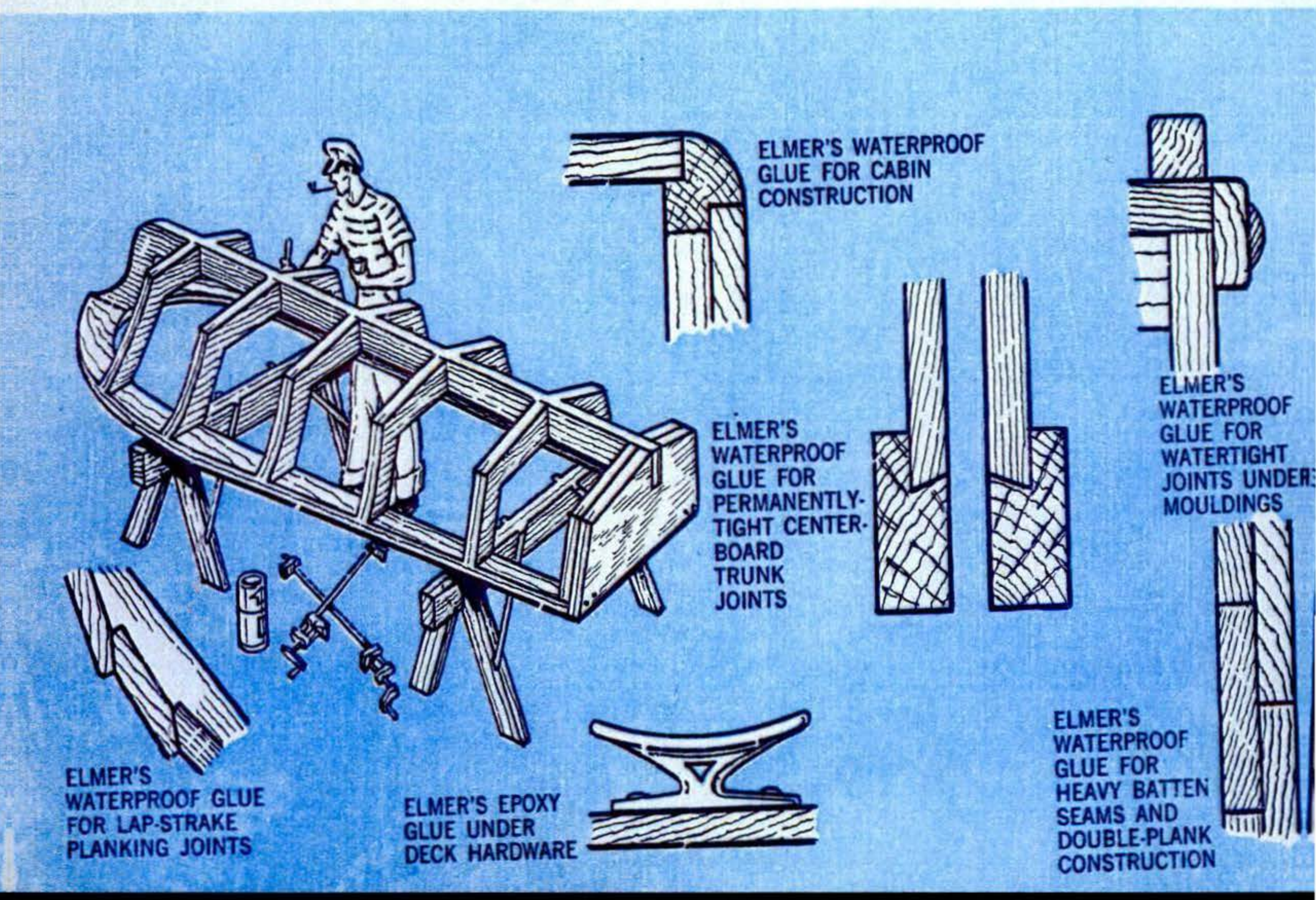
Copyrighted material

# with ELMER'S glues

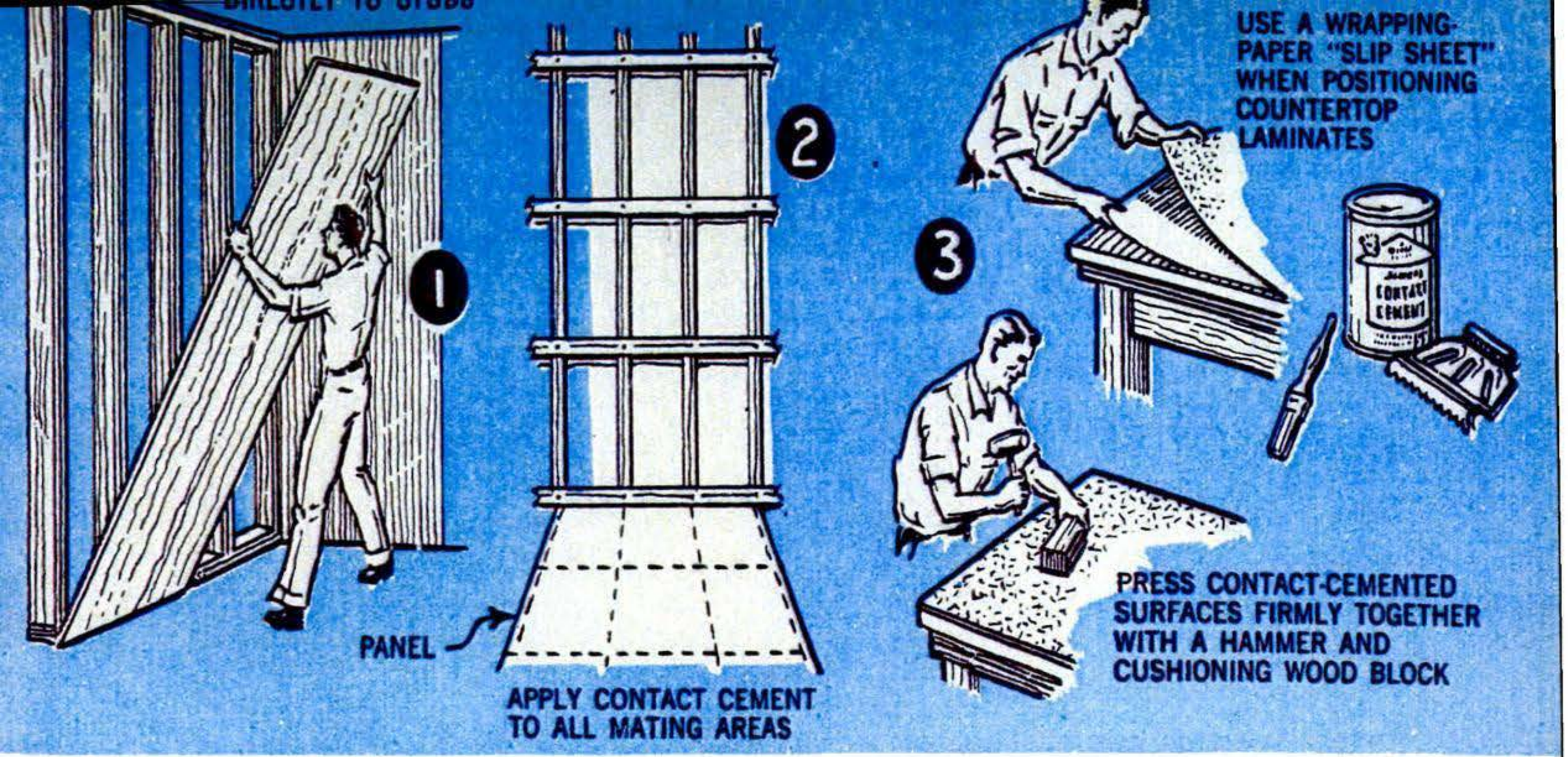
**EXTERIOR WALLS.** Plywood sheathing, glued as well as nailed to framing, is twice as rigid as the same material applied with nails alone, and three times as rigid as nailed diagonal sheathing. This reduces the chance of joint cracks in finish woodwork, and of door and window frames working out of square and causing binding. On the interior side of framing, do not attach wall panels directly with contact cement or glue. Instead, cut 2½-inch strips of ¼-inch plywood and use them as furring–nailing but not gluing them to the framing members. Then cement or glue the panels to the furring. This way, the unglued strips provide flexibility for slight movements caused by shrinkage of the framing (drawing 3).

**HEAVY DOORS.** Sturdy but attractive doors for a tool shed, shop, cabana or wall-enclosed garden are easily made this way: Cut a fir plywood panel the size of the proposed door. Apply ELMER'S Casein Glue to one side and screw random-width, ¾-inch dressed wood paneling boards to that surface. Then repeat the process on the other side. For distinctive shadow lines, use tongue-and-groove stock with bevel edges (drawing 4).

**BOAT CONSTRUCTION.** Whether you're assembling a boat kit, building your own craft from scratch, or simply making routine repairs, use ELMER'S Waterproof Glue for all rigid, wood-to-wood bonds. That goes for everything from ship planking to building up laminated ribs and keels. ELMER'S Epoxy Glue is a first choice, too, for bedding metal fittings against wood parts before applying screws.




Copyrighted material




# Home interior improvements with

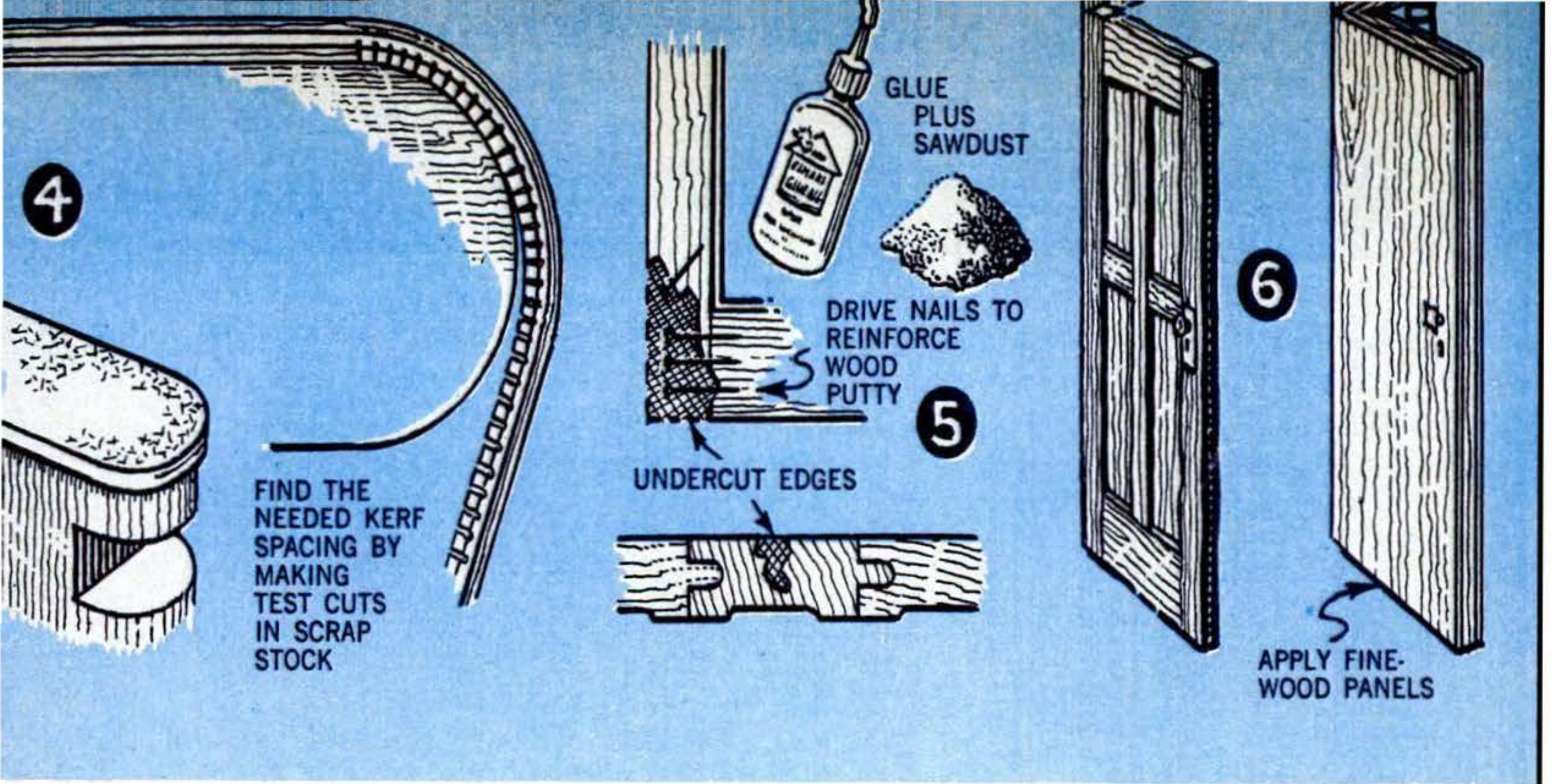
**FINISHING** off a basement rumpus room or attic den? Remodeling a kitchen or bath? Adding built-ins or a bow-bay window? ELMER'S Glues and Cements are as necessary for such projects as the proverbial hammer, saw and screwdriver. Here's just a sampling of their hundreds of applications in new construction and renovating work:

**APPLYING WALL PANELING.** Sculptured and fine wood-veneered plywood, distinctive chip and particle boards, handsomely-finished hardboard—these and many less exotic paneling materials are neatly and easily applied to framing with either ELMER'S Plastic Resin Glue or Contact Cements. Use Plastic Resin Glue, if you like, to attach wallboard directly to studs. Supplement it with nailing to provide necessary pressure while the adhesive sets. Choose either regular or non-flammable Contact Cement for sightly, nail-free bonding. With new framing, cut and pre-fit the panels, marking their areas of contact with the studs. Apply two coats of Contact Cement to each mating surface, allowing sufficient drying time between coats and before positioning (drawing 1). Force the adhesive-coated areas firmly together with light blows of a wood-block cushioned hammer. If you bond panels to unpainted plaster or plywood sheathing, mark the backs vertically and horizontally at 16-inch and 24-inch intervals, respectively. Draw corresponding lines on underlay material and apply 3-inch wide bands of cement to all markings. When surfaces are uneven, use furring strips (drawing 2).

**PLASTIC LAMINATES.** These table and counter-top materials are conveniently applied with ELMER'S Contact Cements. If underlying surfaces have been finished previously, remove the old coating and sand down any irregularities. Clamp the laminate to the surface and cut slightly oversize with a portable sabre-saw or fine-toothed hand-saw. Apply a uniformly thick coat of cement to both bonding surfaces and let dry



Copyrighted material




# LMER'S glues

thoroughly (preferably apply second coat to wood). Next, cover the underlying surface with wrapping paper and position the laminate over it. Withdraw the paper slowly, pressing the laminate down behind it. Working from the center outward, use a hand roller, rubber mallet or hammer and wood block to apply further pressure to the entire surface. Finally, file the edges of the laminate flush and attach metal, wood or plastic trim to the edges (drawing 3).

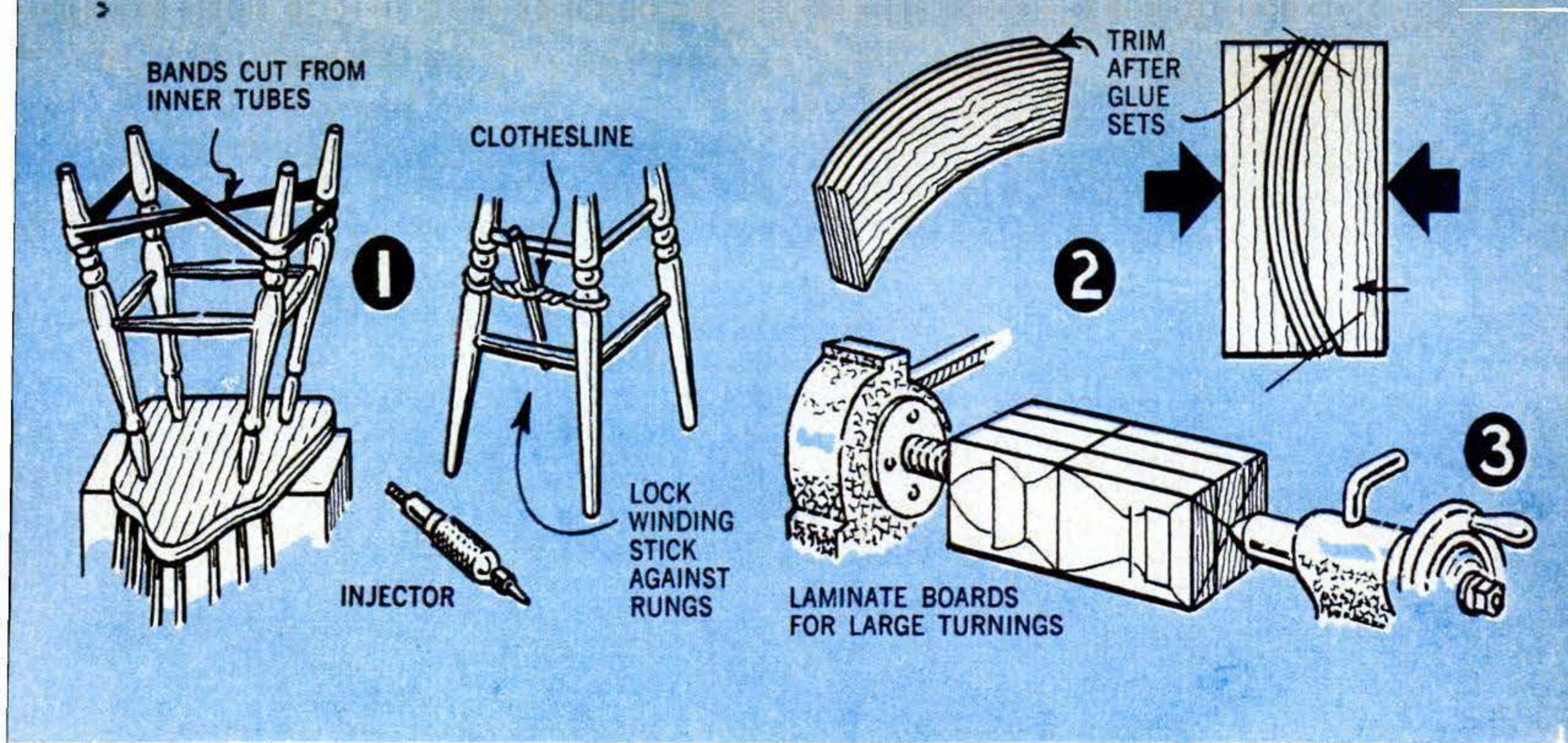
**BUILT-INS.** Use suitable wood joints of the types shown on page 9, when framing room dividers, cabinets, shelving and storage walls. ELMER'S Glue-All and Plastic Resin Glue are both fine adhesives for assembly. Apply clamp pressure wherever possible; in other cases, finishing nails will hold parts snugly together while they set. Countersink the nail heads, and fill the holes with a practically undetectable wood putty made by mixing glue with sawdust of the same material as the product. Occasionally, you may want to bend wood or plywood over a curved frame. Run close-spaced parallel grooves, or "kerfs," across the back of the stock with a bench saw. These increase the wood's flexibility to that of the thinned-down areas (drawing 4).

**PATCHING DAMAGED WOOD.** Commercial wood putty is fine for filling cracks in and between floor boards, and damaged doors, window frames and baseboards. But for the fussy jobs where a close, natural-wood color match is necessary, mix sawdust with ELMER'S Glue-All or, in spots exposed to moisture, Waterproof Glue. Before troweling in the putty, remove all infirm wood around the cavity, and undercut the sides. If the patch will be subjected to much strain drive nails, as shown in drawing 5, to reinforce the putty.

**NEW DOORS FROM OLD.** A battered panel door becomes a modern flush door when you remove its finish and bond ¼-inch plywood to both sides with ELMER'S Glue-All (as shown in drawing 6).



Copyrighted material




# Cabinet and furniture work with

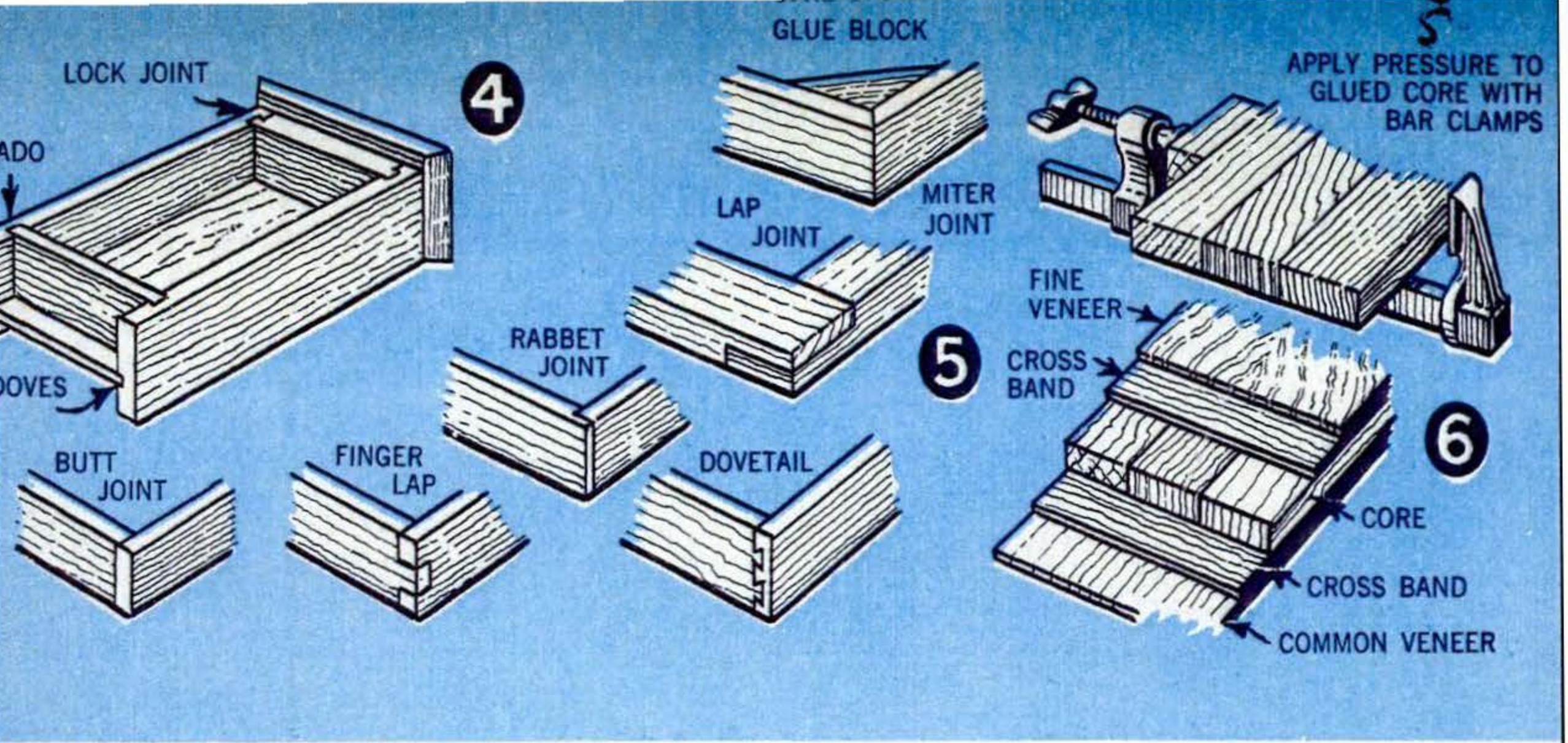
**THE HALLMARK** of fine furniture and cabinet work is good gluing. This depends on the quality of the adhesive, the care taken in applying it, and proper clamping. ELMER'S Glue-All and Plastic Resin Glue make the best furniture bonds. Providing the right gluing conditions is easy. While no craftsman has ever complained of owning too many clamps, you can get by with relatively few, plus a bit of ingenuity.

**TABLES AND CHAIRS.** Here, adequately-deep sockets and mortises, along with snug fit, are essential for lasting glue joints. With new work, apply a slight taper to the shouldered-down ends of spindles and to tenons for firm wedging action. When regluing, don't just slap on the new adhesive. First, scrape off all former, hardened glue to expose the wood pores for proper penetration. The single exception is the rickety chair or table whose members haven't yet parted company. There, your best bet is an inexpensive tool called a glue injector. To use it, you bore a 1/16-inch hole through the wood and into each loosened joint. Then you insert the tip of the injector and squeeze in glue with a plunger. Commercially-made bar clamps are useful for putting pressure on chair and table assemblies. But you can do it simply by lacing strips of old inner tubes between parts, or using tourniquet action of a stick on clothesline (drawing 1).

**LAMINATING.** For maximum strength, curved parts like rockers and the tops of chair backs must be formed by bending the wood. With solid stock, this involves prolonged steaming, followed by a day's drying time in heavy forming equipment. The fast and easy alternative is to build up the part from a number of thin plies, gluing them face-to-face and placing the assembly between comparatively light-forming blocks immediately after completion (drawing 2). Laminating is useful, too, when reproduc-



Copyrighted material




# ELMER'S glues

tions of period furniture call for heavy wood turnings. Thoroughly seasoned stock of the required thickness is hard to find, and expensive. Instead, glue a number of thinner plies together (drawing 3).

**CABINETS AND CHESTS.** Smooth-sliding drawers and well-fitting doors depend on rigid frames and enclosures. When you combine ELMER'S Glue-All or Plastic Resin Glue with trim cabinetmakers' joints, you have an unbeatable team. If you're using miter joints at corners, back them up with reinforcing wood triangles, or "glue blocks." Drawers, too, benefit by gluing. Today's popular "concealed-edge" type can be made without complicated table-saw setups, just by gluing face panels with beveled vertical edges to the forward structural members of the assemblies. Drawing 4 shows such a drawer and, with drawing 5, illustrates wood joints commonly used in furniture construction.

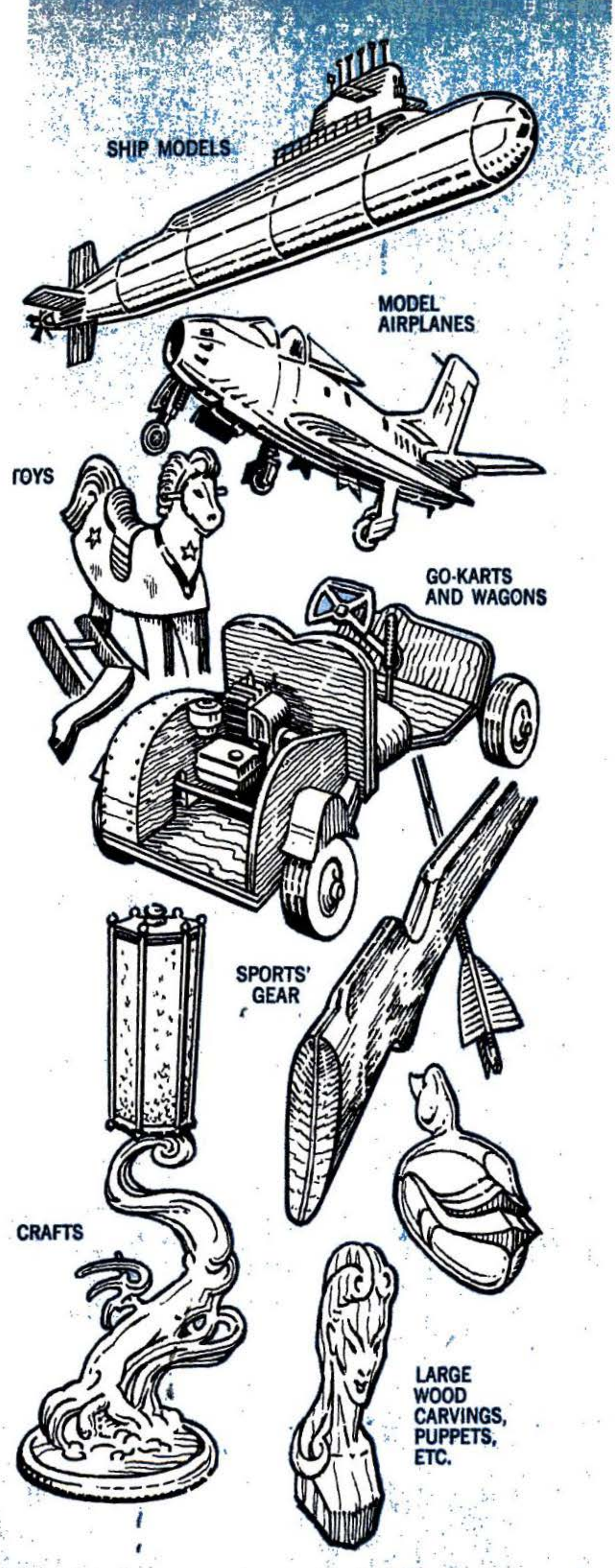
**HI-FI CABINETS.** These, and most particularly speaker enclosures, must not produce vibration or resonance. Heavy plywood members bonded with ELMER'S Glues insure distortion-free sound.

**BOOKCASES.** Hardboard or plywood panels nailed and glued to the backs of frame bookcases "beef up" construction; make possible non-sagging shelves with spans as long as 8 feet between supporting partitions.

**VENEERING.** Experts agree that the most beautiful wood-surface textures are produced by sawing heavy tropical trees in ways that expose highly-figured grain patterns. Veneers of this type are comparatively inexpensive. Apply them to plywood underlays with ELMER'S Plastic Resin Glue, and hide the laminated edges with veneer strips. For heavy jobs, glue a number of softwood boards or planks edge to edge. Then apply a thin wood panel to each surface of this core, with its grain at right angles to that of the boards. Cover one of these "cross-bands" with finewood face veneer, the other with a plainer veneer (drawing 6).



Copyrighted material




# Toys and models

**STRONG,** clean-to-handle and clear-drying ELMER'S Glue-All has no equal as a fun-project adhesive. Use it to assemble and repair practically any indoor toy or model made of wood. The exceptions, of course, are those intended for bathtub launching. There, and for outdoor service, ELMER'S Waterproof Glue is tops. A check list of the more obvious uses for these two adhesives includes:

Toy and model airplanes and rockets, boats, old-time automobiles, racing cars, historic wagons and coaches, locomotives and rolling stock. Right-of-way structures and scenery for table-top railroads. Bodies for soapbox derby racers, go-karts, quarter-racers. Dollhouses, playhouses, miniature furniture. Marionettes, puppets.

When gluing small softwood parts together, clamping is rarely necessary. If it is (for alignment rather than strength), use rubber bands or spring-type clothespins. Build up laminated blocks for ship-model hulls, marionettes, hobbyhorses and the like, just as you would for furniture parts. Lastly, don't overlook ELMER'S Epoxy Glue when you're attaching wooden wheels to wire axles, anchoring car bodies to chassis, or applying brass, aluminum or pot-metal boat fittings to a hull or superstructure.

# Sports' equipment

**CUSTOM**-shaping your own laminated gun-stocks, decoys, fish lures, aquaplane, surf-board or water skis? For these and dozens

of other sports' equipment projects, ELMER's Waterproof Glue is the only adhesive for craftsmen who want the best. Joints made of it withstand practically everything: Continuous outdoor exposure, zero-cold or boiling water, moist or dry heat, mould or fungus, solvents, alkalis, acids.

# Arts and crafts

**WOOD** sculpture, stock for hardwood bowl turning, and blanks for pattern making often call for laminated assemblies. Use ELMER'S adhesives. Glue-All is the perfect, colorless bonding agent for driftwood lamp assemblies. Bed the electrical fixtures in place with ELMER'S Epoxy Glue. Metal and wood are being combined today in popular wire-sculpture projects ranging from book ends and candle holders to aquarium frames, mobiles and lamp shades. Again, ELMER'S Epoxy Glue is the right adhesive. Planter boxes? Use exterior-type plywood and ELMER'S Waterproof Glue.

It all adds up to this: *There's an ELMER'S Glue for every job you do.*

## Where to write for lists of woodworking plans:

Albert Constantine & Son, Inc.
New York 61, N. Y.
(catalog, 25¢)

California Redwood Assn.
Financial Center Bldg.
San Francisco, Calif.

Craftsman Wood Service Co.
2729 S. Mary St.
Chicago 8, Ill.
(catalog, 25¢)

Craig Craft
Tonawanda 1, N. Y.
(boat-plan catalog, 25¢)

Delta Mfg. Co.
600 E. Vienna St.
Milwaukee, Wis.

Dept. of Housing and Design
Cornell University
Ithaca, N. Y.

Douglas Fir Plywood Assn.
Tacoma 2, Wash.

Easi-Bild Pattern Co. Inc.
Pleasantville, N. Y.

Home Service Bureau
Masonite Corp.
111 W. Washington St.
Chicago 2, Ill.

Minnesota Woodworkers Supply Co.
1713 Olson Highway
Minneapolis, Minn.
(catalog, 10¢)

National Home Study Council
2601 16th St.
Washington, D. C.

U. S. Gypsum Co.
300 W. Adams St.
Chicago 6, Ill.

U. S. Plywood Assn.
55 W. 44th Street
New York 36, New York

Western Pine Assn.
Yeon Bldg.
Portland 4, Ore.

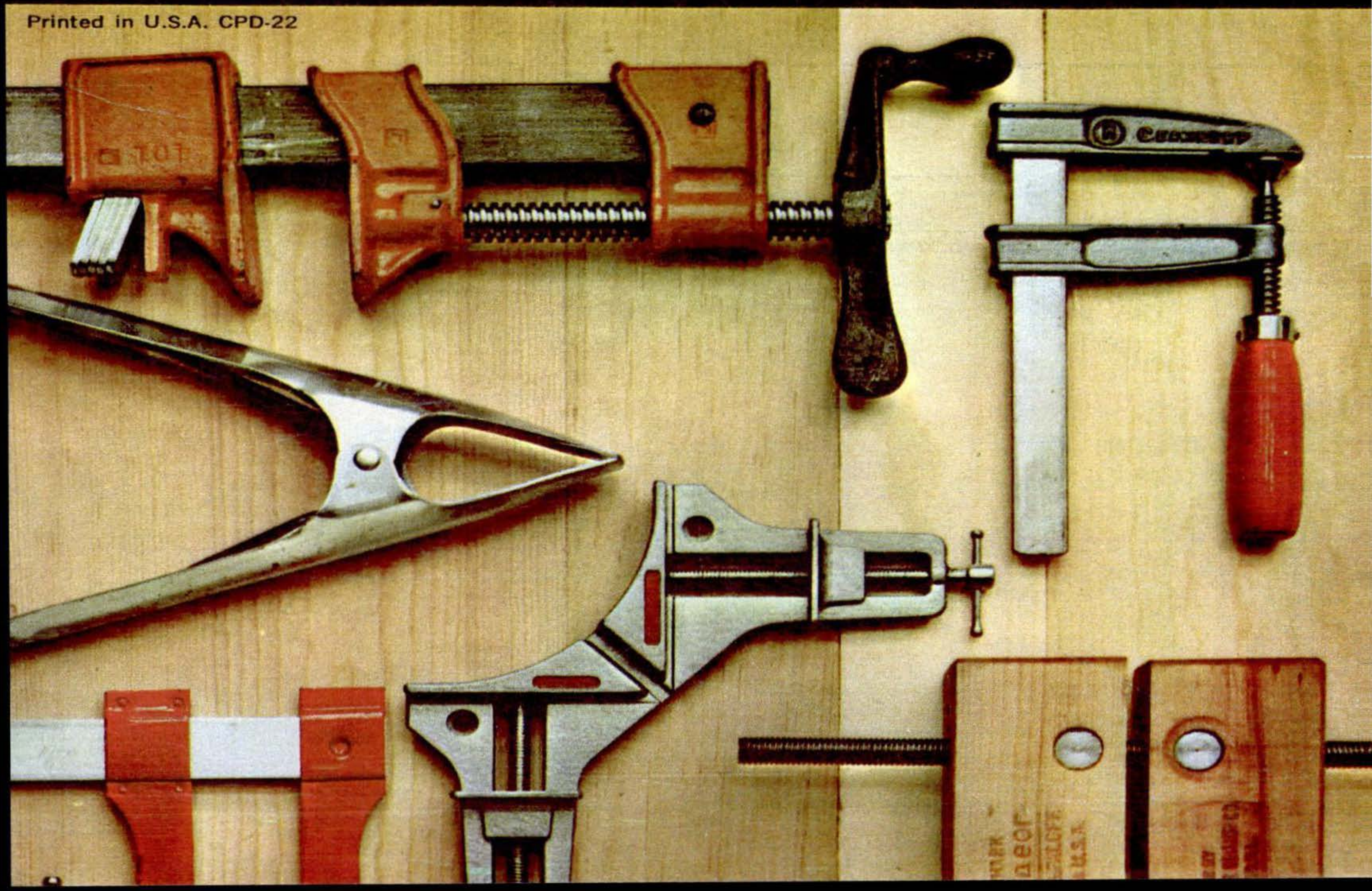


Copyrighted material

# ELMER'S WOOD-GLUING HANDBOOK

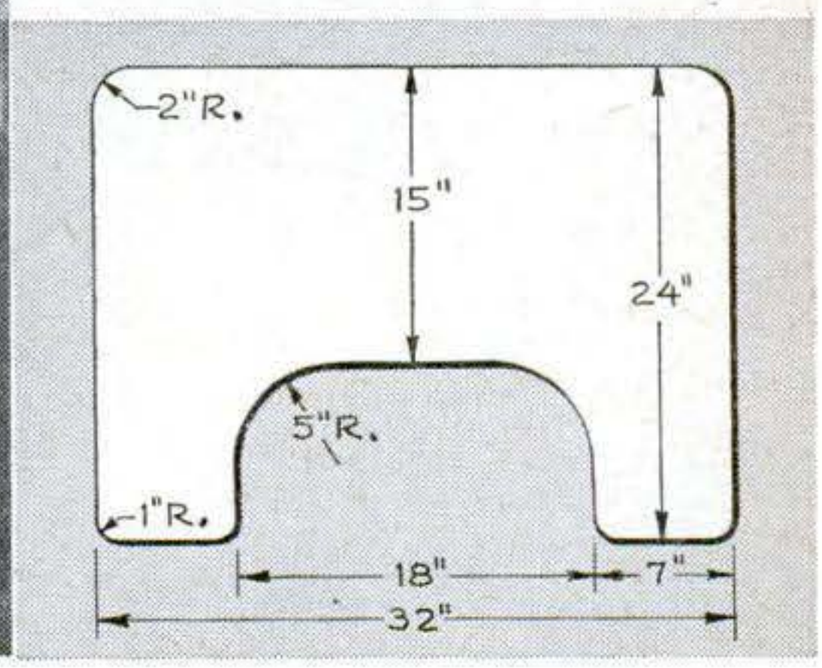
THE BORDEN CHEMICAL COMPANY, A DIVISION OF THE BORDEN COMPANY, NEW YORK 17, N.Y.

Printed in U.S.A. CPD-22



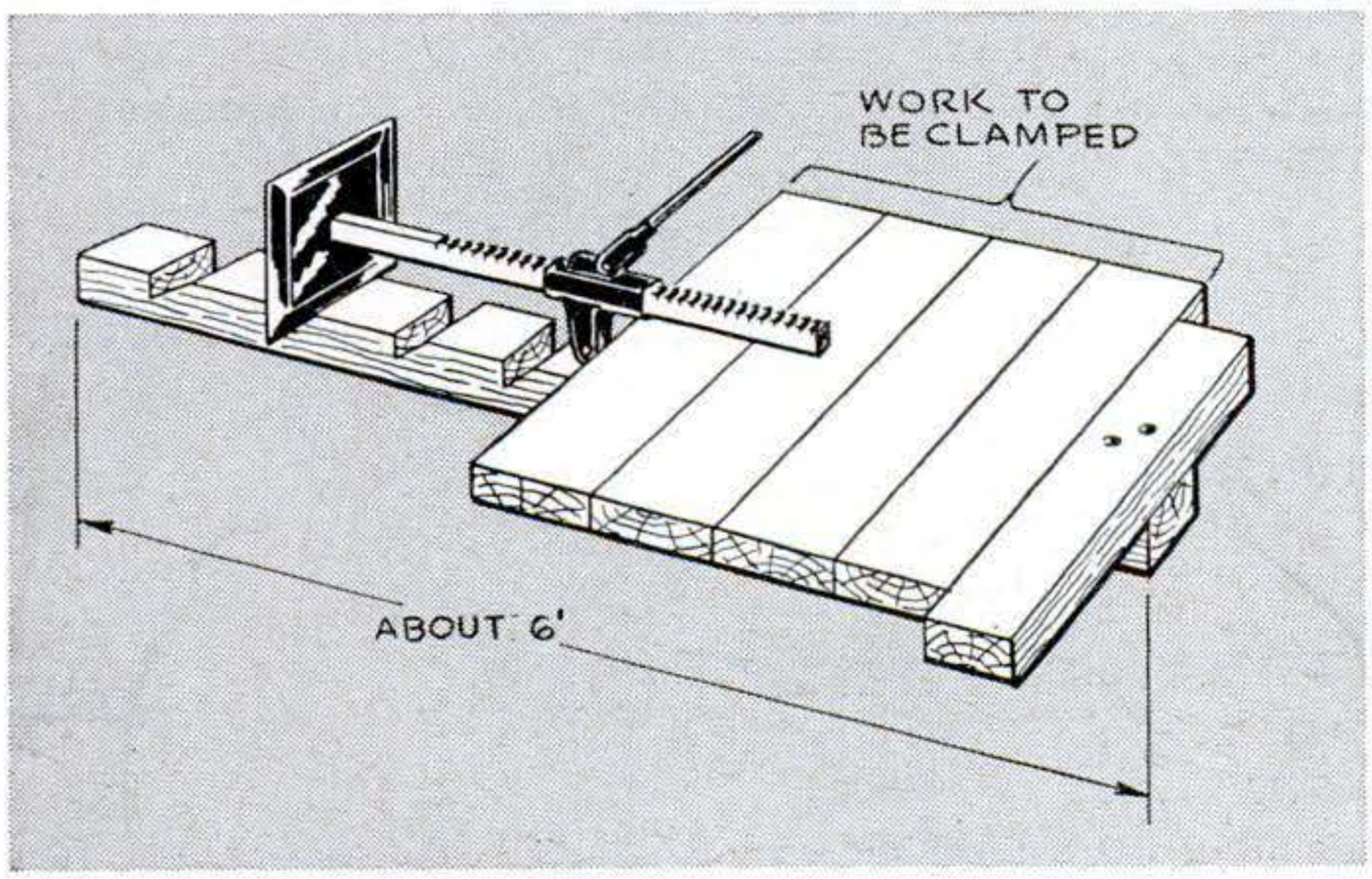
Copyrighted material

# Short Cuts and Tips
FROM PS READERS




## Lap Board for Armchair

YOUR favorite easy chair becomes a writing desk, snack bar, or solitaire table when you bridge the arms with this easily made lap board. Once you're through with the board you just lift it off and store it beside or behind the chair. The size shown fits standard chairs. Cut it from plywood, hardboard, or any other rigid sheet material, and smooth all edges. —*E. T. Roetman, Atlanta, Ga.*




## Using a Car Jack as a Bar Clamp

GOT a panel to glue up that's too wide for any of your clamps? You can rig up a device with unlimited capacity, using only an auto jack and two pieces of two-by-four. Half of the long piece should be notched every 6″ to provide toe holds for the jack base. The short piece is fastened at the other end as a stop.—*Steve R. Scadding, Toronto, Ont.*

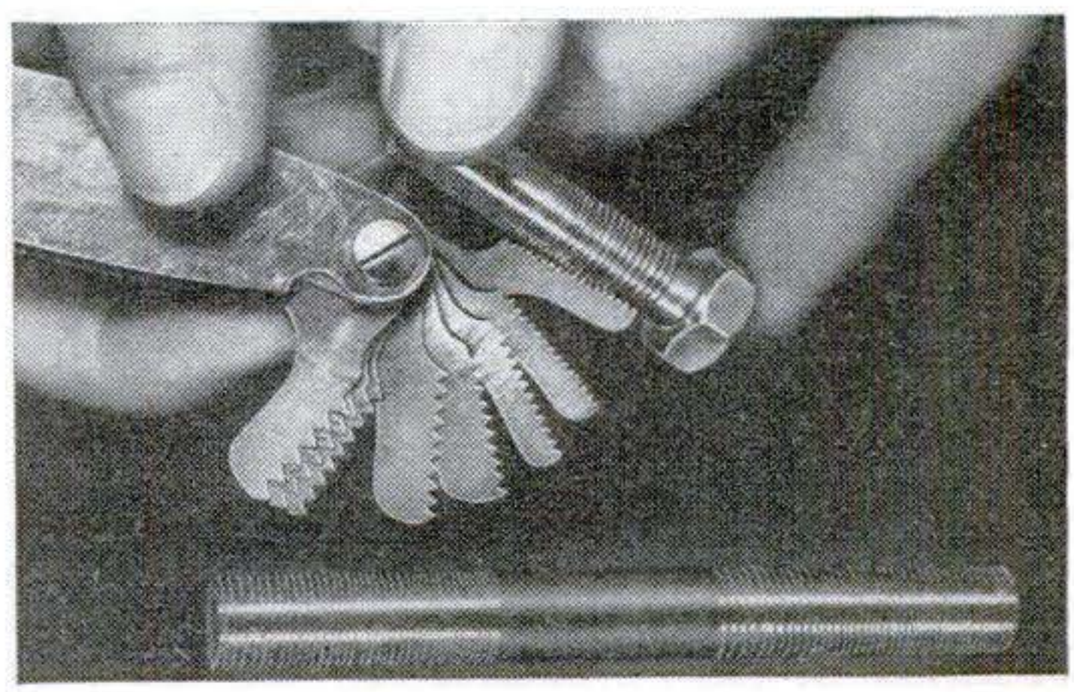
WHAT'S YOUR MECHANICAL IQ?

# How Was This Thread Cut?

YOU can drive your shop-wise friends crazy trying to figure how you made this bolt with a varying pitch thread.

Near the hump (see photo) it starts out as a watch-screw thread—about 100 threads per inch—then widens progressively until it becomes a fat 15 or 20 threads per inch near the bolt head.

The trick is simple, but seldom guessed. Turn the page for details on cutting this completely impractical thread.

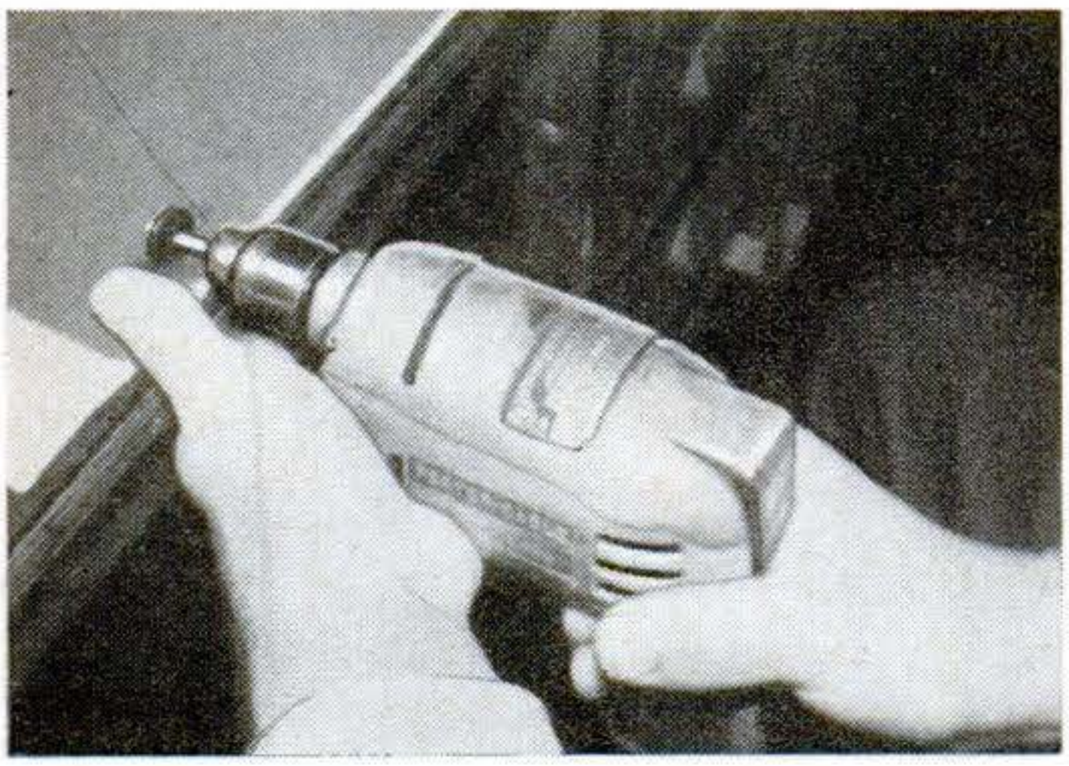




Copyrighted material

# Short Cuts and Tips

FROM PS READERS



## Trimming a Washer to Size

CAN'T locate a washer the size you need to repair a dripping faucet? You can trim an oversize washer to the exact diameter by turning it onto a wood screw that's slightly larger than the hole, and chucking this in an electric drill. Spinning the edge of the washer against sandpaper or a file will turn it down.—*Harry Wheeler, Toledo, Ohio.*

## Tumble-Drum Cleans Chains

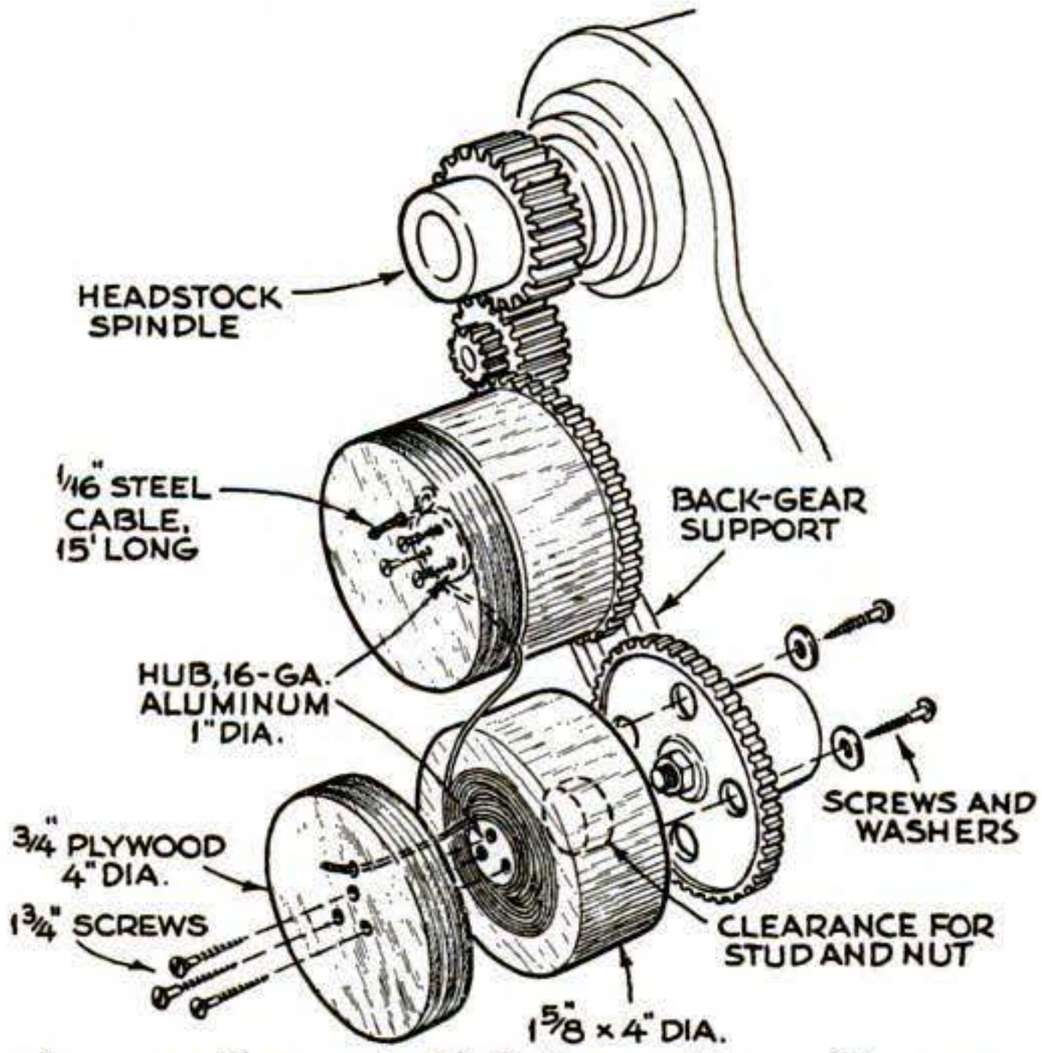
AN ARMY man's ingenuity solved the problem of cleaning dirty or rusty truck chains. Sgt. C. L. Murphy attaches a 50-gallon drum to the wheel of a 2½-ton truck and fills it with old chains and newspaper. Then he jacks up the back wheel, starts the motor, and tumbles the chains until they're as shiny as new.—*William R. Kreh, Silver Spring, Md.*

# Here's How Those Threads Were Cut (See preceding page)

EVER rewind movie film and notice how the rear reel starts slow, turns faster as film builds up on the take-up reel?

Two drums wound with steel cable work the same way to increase the speed of the lathe lead screw while the thread is being cut. Each drum is made in three parts: a 4″-diameter disk cut from two-by-six, a similar disk of ¾″ plywood, and a 1″-diameter hub of 16-gauge aluminum fastened between the two to form a groove in which 15′ of 1/16″ cable will wind over itself. Bolt the drums to the largest back gears and install on the lead screw and driver studs.

Start with all the cable wound on the lead-screw drum and run the lathe at slowest speed. Feed the threading tool into the rod or bolt being threaded and




advance the cut slightly as threading progresses so that the larger threads will be proportionately deeper. As the cable winds onto the driver drum, its diameter will increase, and the diameter of the wound cable on the lead-screw drum will decrease, causing the lead screw to rotate faster. This increases the thread pitch.



Copyrighted material

# HOW TO CHOOSE AND INSTALL

# Radio Controls for the Model Savannah

***Part IV. Start, stop, steer, and reverse the ship from shore with a no-license, citizens-band transmitter***

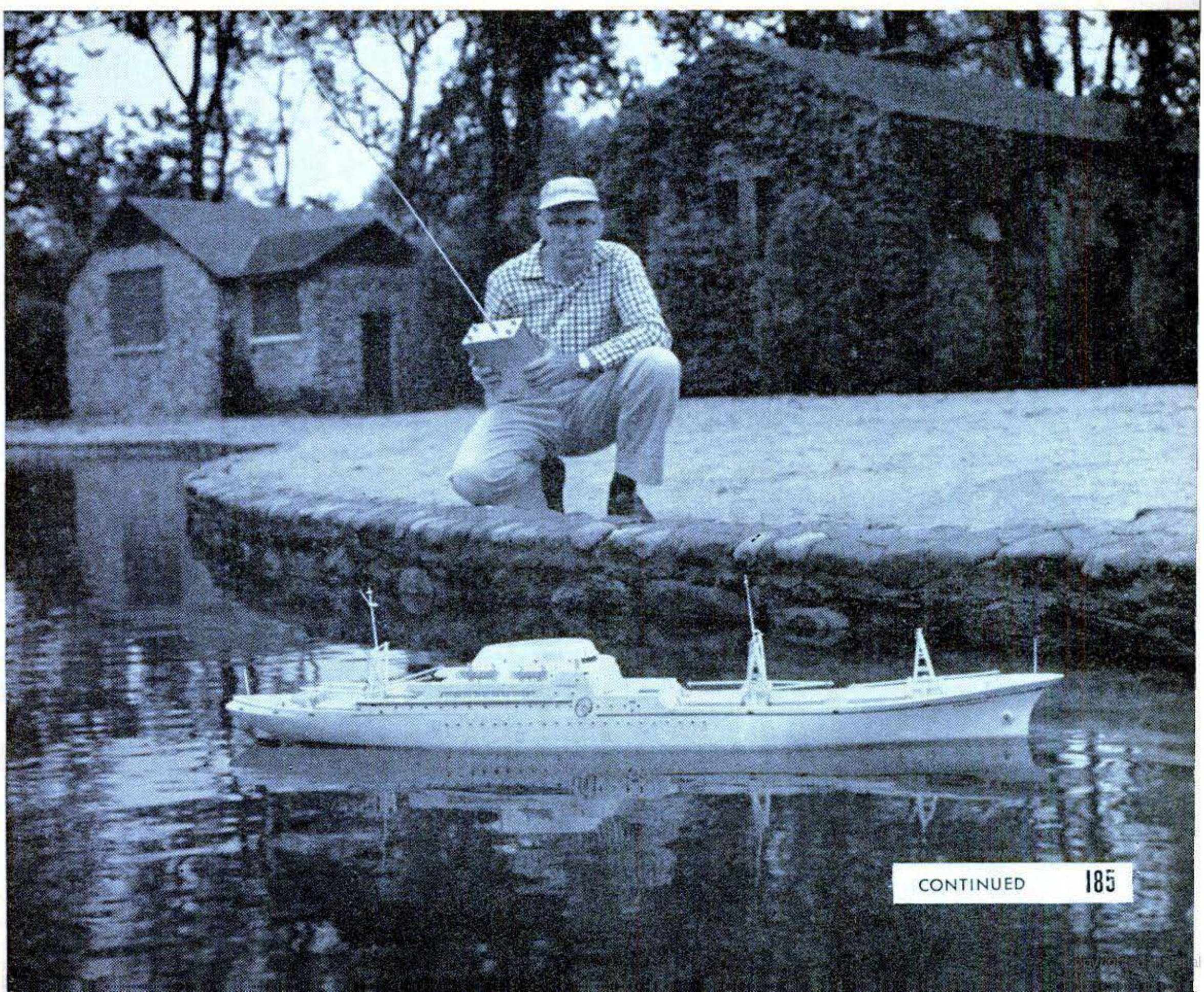
**By Howard McEntee**

WITH a winter's shipbuilding work behind you, and the feel of spring in the air, you're ready for the final step—installing radio controls in your model.

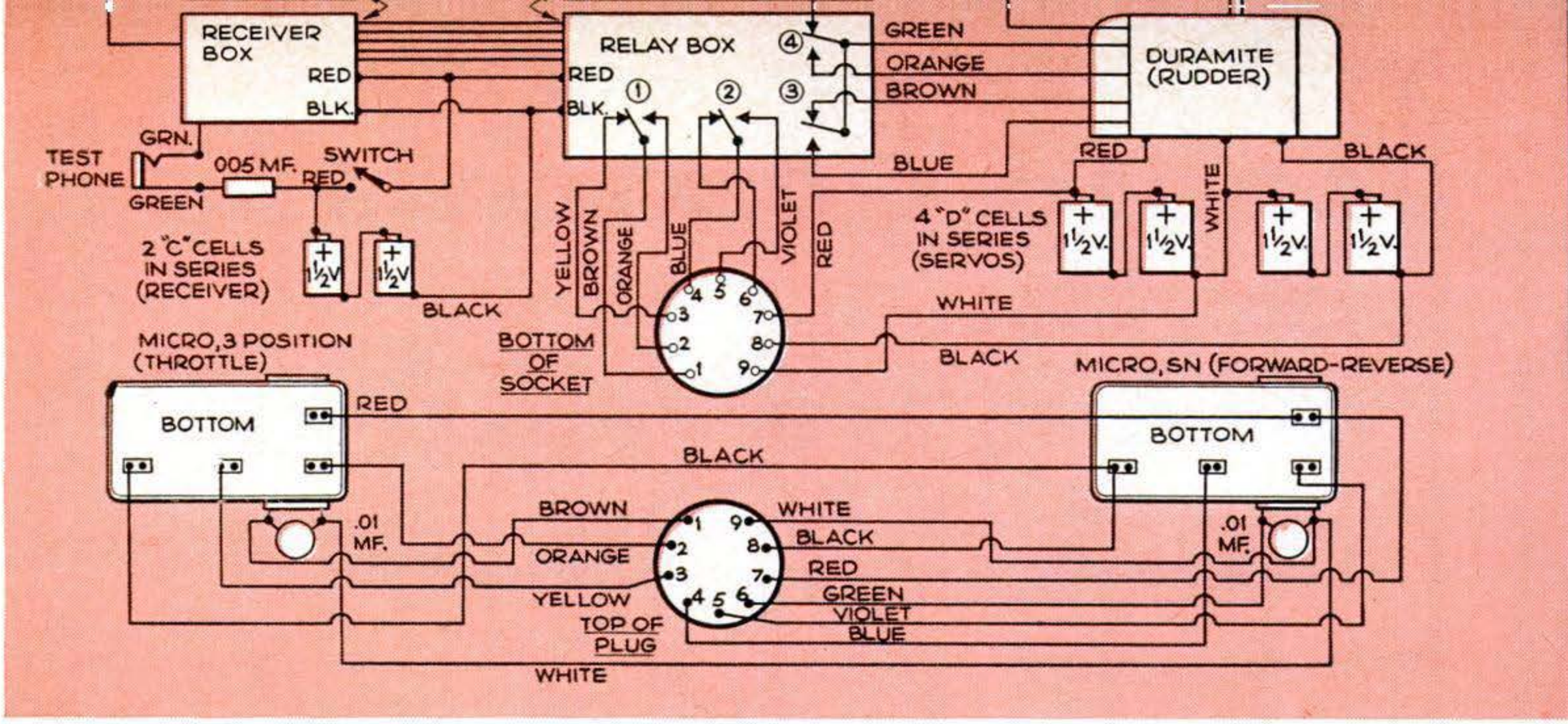
Any shore beside quiet water can be your navigation deck. The ship's helm and engine-room quadrant are in a compact radio transmitter you can hold in your hand. Inside the ship are the engineers—tiny obedient servos that respond to signals sent by the transmitter.

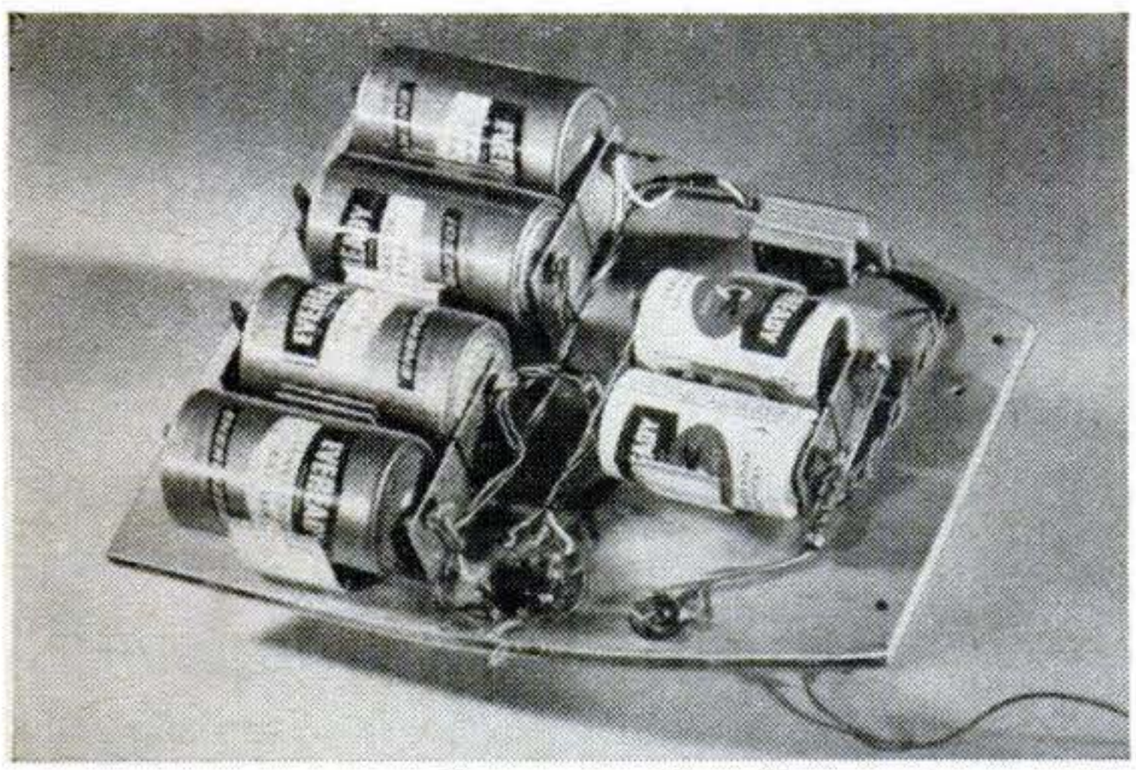
In selecting your radio-control equipment, you must balance what you want the ship to do against how much you want to spend.

At the low end of the price range, with a single-channel CW (continuous wave) kit costing about $45 you can run one servo through a sequence of four simple controls, such as forward, right rudder, reverse, and left rudder. The disadvan-



CONTINUED



**SIX DRY CELLS** supply power for the equipment in the ship. Four D cells operate the servos; two smaller C cells energize the radio receiver. Wiring goes through a nine-pin plug to receiver and servos on the other side of the plywood base.

**Cost of Typical R/C Outfits**

| Equipment | Single Channel | Four Channel | Type Used by PS | Ten Channel |
|---|---|---|---|---|
| Transmitter | $20.00 | $120.00 | Min-X | $120.00 |
| Receiver | 20.00 | Incl. with transmitter | | 150.00 |
| Tuning earphone | — | 1.50 | Crystal | 1.50 |
| Tuning meter | 4.50 | — | — | — |
| Tuning tool | .50 | .50 | Hex | .50 |
| Switch, wire plugs, & socket | 2.00 | 3.00 | See text | 4.00 |
| Receiver bats. | 3.50 | .50 | Two C cells | .50 |
| Trans. batteries | 5.00 | 5.00 | A and B | 5.00 |
| Steering servo | 11.00 | 13.00 | Duramite | 13.00 |
| Fwd.-Rev. servo | 10.00 | 10.00 | Cobb Micro SN | 10.00 |
| Throttle servo | — | 10.00 | Cobb Micro 3-position | 13.00 |
| Servo batteries | 1.00 | 1.00 | Four D cells | 1.00 |
| Battery holders | 2.00 | 1.50 | Three spring clips | 1.50 |

tage, of course, is that you must go through the first three controls to get to the fourth, resulting in slightly erratic operation of the ship.

At the opposite extreme is a $300, 10-channel rig that will permit separate steering, full control of throttle and reverse, plus the luxury of being able to drop and raise anchors, turn on lights, lower lifeboats, and blow a whistle. You can even put in a small tape recorder and play the busy sounds of a harbor as your ship comes into port.

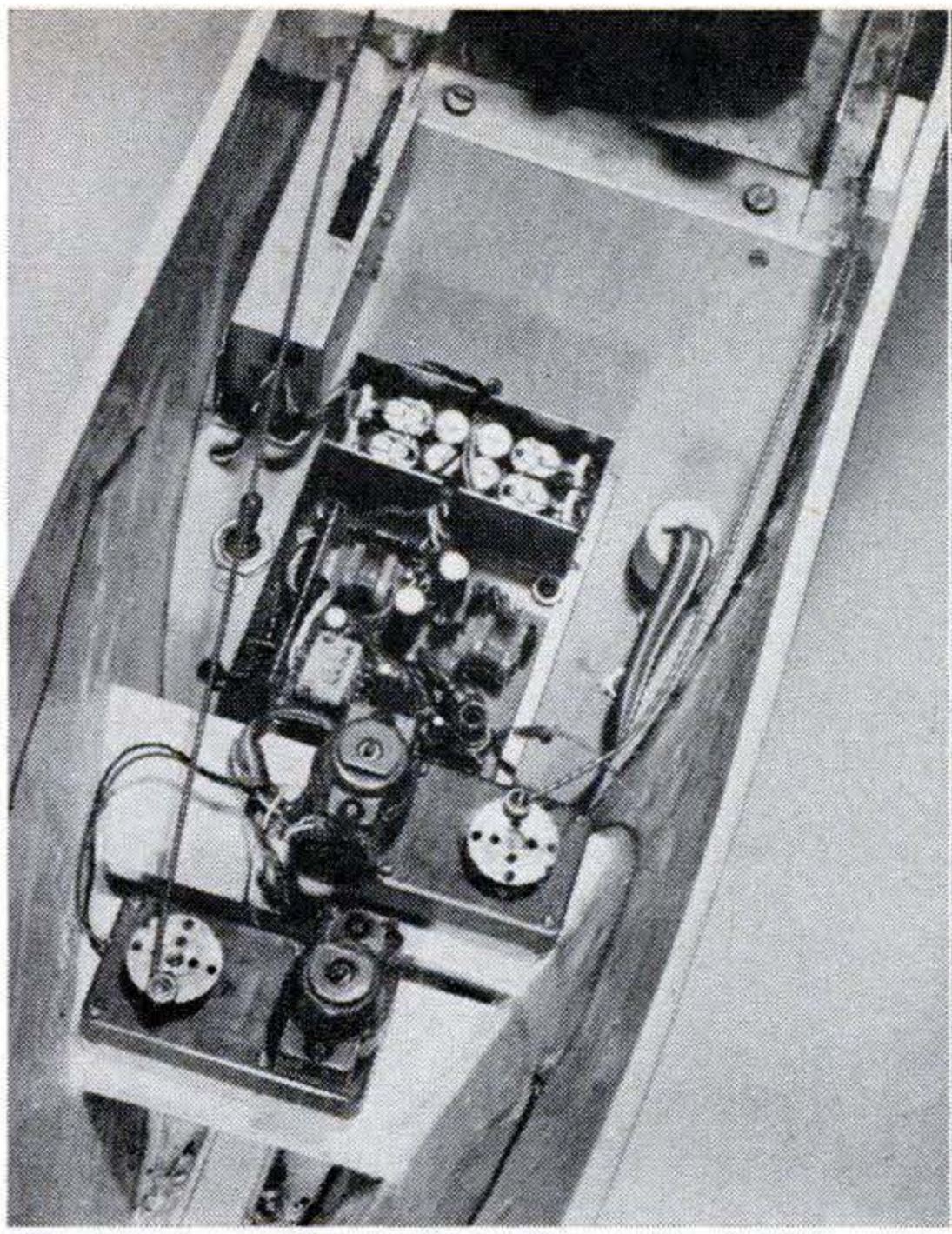
The R/C rig illustrated is a four-channel tone outfit costing about $165. It permits steering in either direction at will, plus independent forward and reverse, and throttle control at off, half, and full positions. With this setup you maintain precise control of the ship and eliminate the tricky key work necessary to run through a continuous sequence of operations on a single channel. A breakdown of costs is given at left so you can compare the low-, medium-, and high-priced outfits. By buying kits instead of assembled equipment, you can save at least 25 percent.

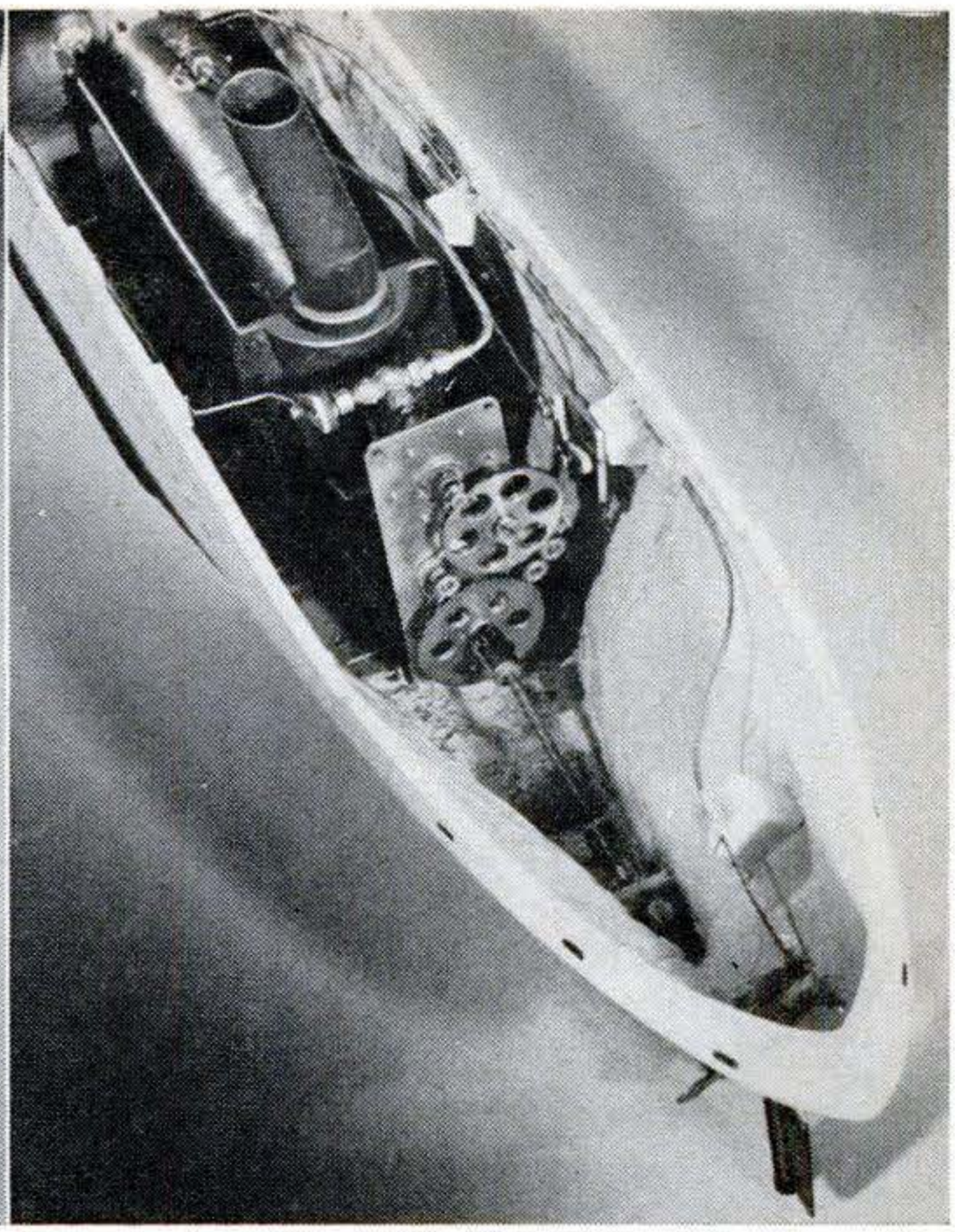
***Installing the receiver.*** Hook up and install the receiver first, following instructions that come with it. Cement the two parts of the receiver to a plywood base. To the underside of the base cement a layer of foam rubber to cushion the delicate receiver against vibration. Finally, fasten it down by cementing the foam rubber on top of the main base in the hull.

Screw holders for the three sets of

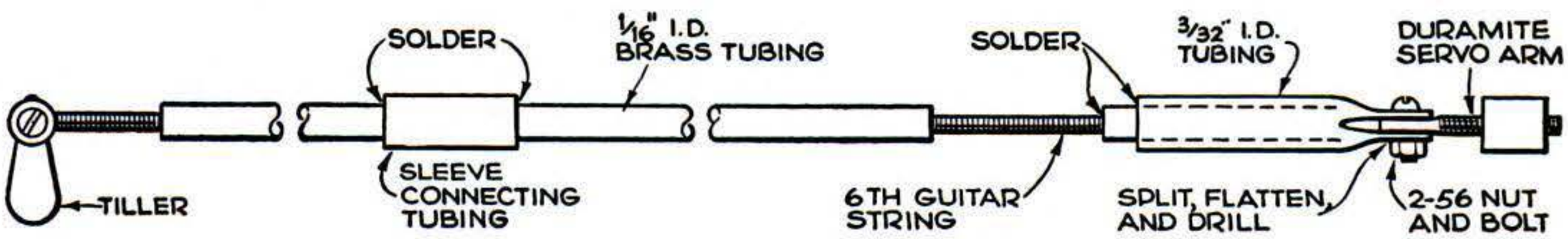


Copyrighted material





**RECEIVER AND SERVOS** are installed near bow, away from heat of boiler. Covers are removed from two parts of receiver in photo at left to show four relays (one for each channel) and receiver itself. Disks on two forward servos rotate to move push rods connected to throttle and reverse. Arm slides back and forth in servo (top left of photo) to steer rudder through flexible cable. The picture at right shows push rods and flexible cable terminating at controls.



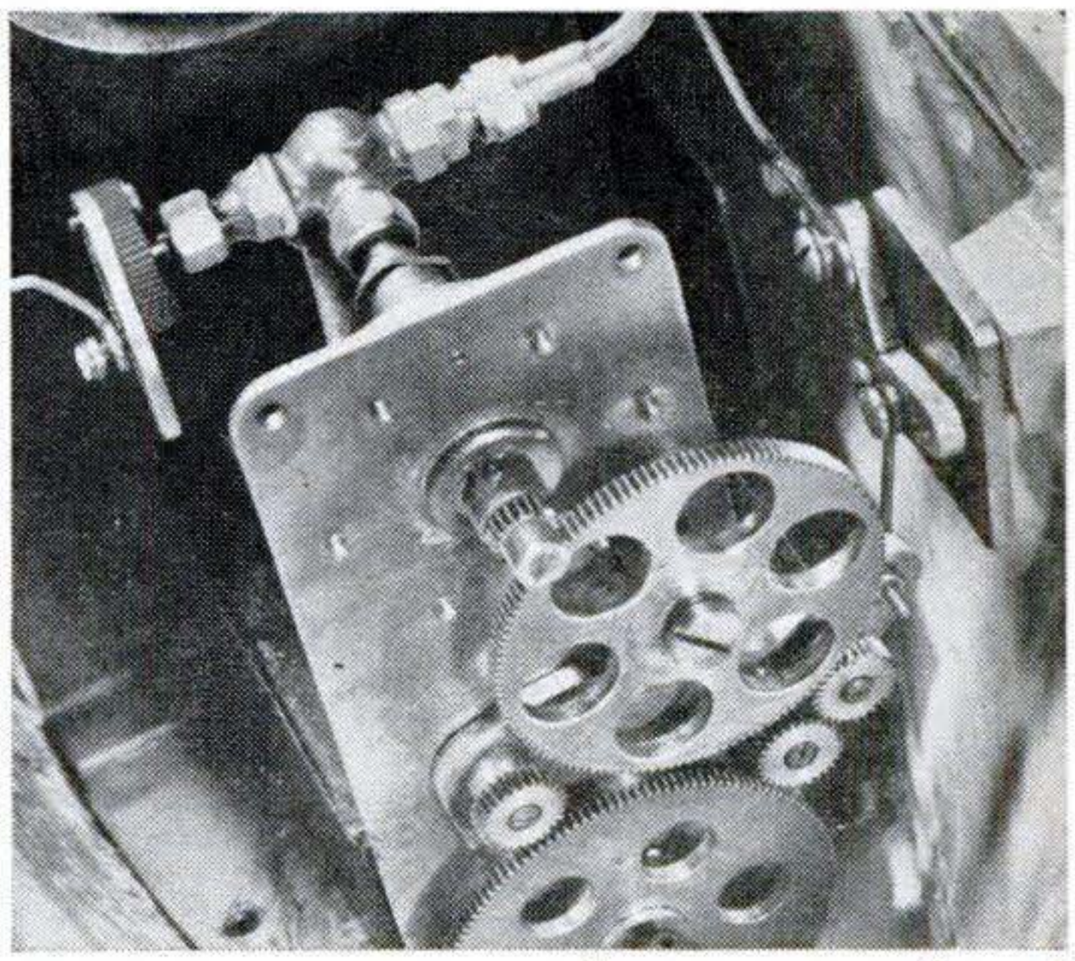

**SMOOTH-WORKING FLEXIBLE CABLE** can be made from a guitar string housed in 1/16"-i.d. brass tubing. Hobby shops sell the tubing in 1' lengths, so two lengths must be joined with a sleeve, as shown above, to reach the rudder.

dry cells to the underside of the main base. This places the weight of the batteries at the lowest point in the hull, to keep the ship stable.

A nine-pin plug and socket connect the batteries on the underside of the base to the receiver and servos above. Follow the color coding in the wiring diagram and complete one circuit at a time through the plug.

An on-off toggle switch on the base shuts off the receiver. No switch is needed for the servo D batteries as all servo circuits are open when the receiver is off.

A small jack, also mounted on the



**GEARS ARE REVERSED** when servo push rod moves bell crank (at right in photo). Push rod at left swings metal arm on valve wheel to Off, Half-Open, and Full-Open positions, depending on signal sent from the transmitter.

CONTINUED



Copyrighted material

base, enables you to plug in an earphone for accurate tune-up of the receiver. A .005-mf. condenser soldered into the wire running to the jack keeps DC from damaging a crystal earphone.

***The servos.*** Install the plastic Cobb servos up near the bow, away from the heat of the boiler. Fasten a shelf across the hull with epoxy glue and screw the servos to the shelf. Screw the metal Duramite servo on the baseplate that supports the receiver.

Two types of linkage were used to connect the servos to the operating parts. A flexible cable consisting of a "sixth" guitar string housed in a length of $\frac{1}{16}$"-i.d. brass tubing connects the Duramite servo to the tiller on the rudder post. Operate the servo to determine its throw and drill a hole in the tiller far enough out from the post to make the most of the servo action.

The forward-reverse servo moves a stiff wire push rod connected to a bell crank mounted on the hull side above the reverse lever on the gear train. Since the servo throw is greater than needed to bring the gears into mesh, a slotted brass plate is soldered to the bell-crank end of the push rod. Make the slot long enough to waste part of the throw yet bring the gears firmly together. Small staples driven into wood blocks cemented to the hull sides guide the push rod and keep it from buckling.

A similar push rod links the throttle servo to a metal arm fastened to the fiber handwheel on the globe valve.

***The antenna.*** Tape a 2′ length of hook-up wire to the inside of the hull and solder one end to the antenna lead on the receiver. This has given ample sensitivity for all test runs that have been made—some more than 100 yards from the transmitter. If you want to run your model until it's almost out of sight, better string fine wire from the masts to serve as the antenna. Run an insulated wire down the forward mast and through a hole drilled in the deck to connect it to

# An Electric Motor Can

YOU can take the easy way—and save money, too—by powering your Savannah with a miniature electric motor. With it, you won't have to fire up a head of steam each time you run the model.

Glue a ¼"-plywood platform in the hull bottom, and fasten the motor, battery, and control switch on it. Raise the motor on wood chocks to align it with the propeller shaft.

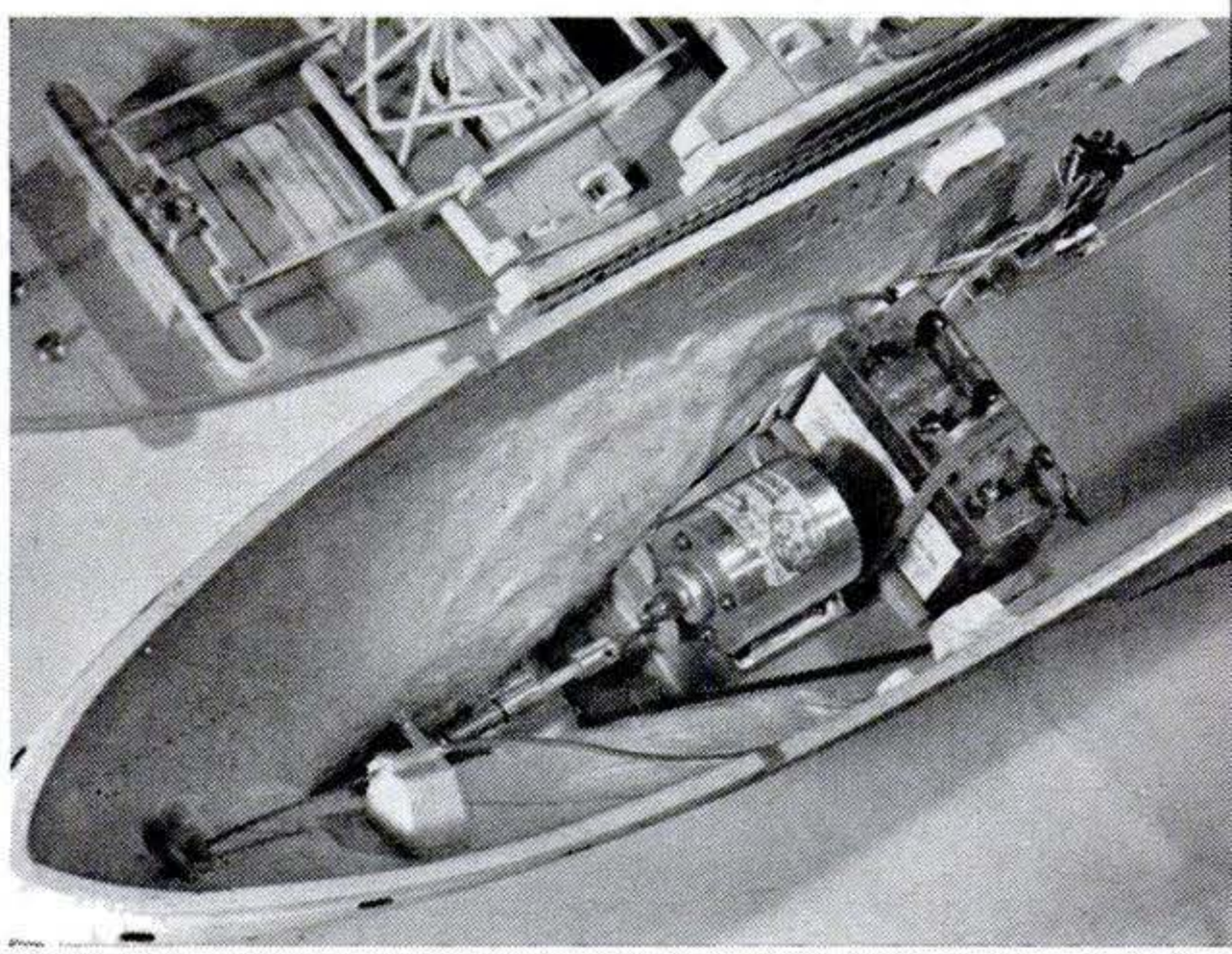
Glue wood strips to the platform to keep the battery from shifting, and hold it down with a heavy rubber band stretched between two screw-eyes.

A four-channel radio control, similar to the one used for the steam installation, directs the electric drive. One channel actuates a Cobb three-position servo linked to the telephone switch by a push rod. Keying the transmitter in sequence switches to forward, reverse, and off.

Two channels control steering, permitting left or right turns at will.

As a final touch, a small horn can be

| Parts Used for Electric Drive | App. Cost |
|---|---|
| Sterling King Beaver motor #KB-695 | $6.95 |
| Beaver #KB-75 reduction gear | .75 |
| Pittman #7502 flexible coupling | .60 |
| Aristo-Craft #64 battery | 4.75 |
| Aristo-Craft B-1 horn kit | .35 |
| Telephone switch (Lafayette Radio) | .69 |
| Two ceramic condensers, .01 mf., 300 v. | .40 |



**MOUNT THE MOTOR** on chocks to align it with the prop shaft. A universal joint compensates for slight misalignment between the two. Battery is a six-volt wet cell. It will run the motor for about two hours and can be recharged with a small trickle charger or a DC model-railroad power pack set to put out six volts.



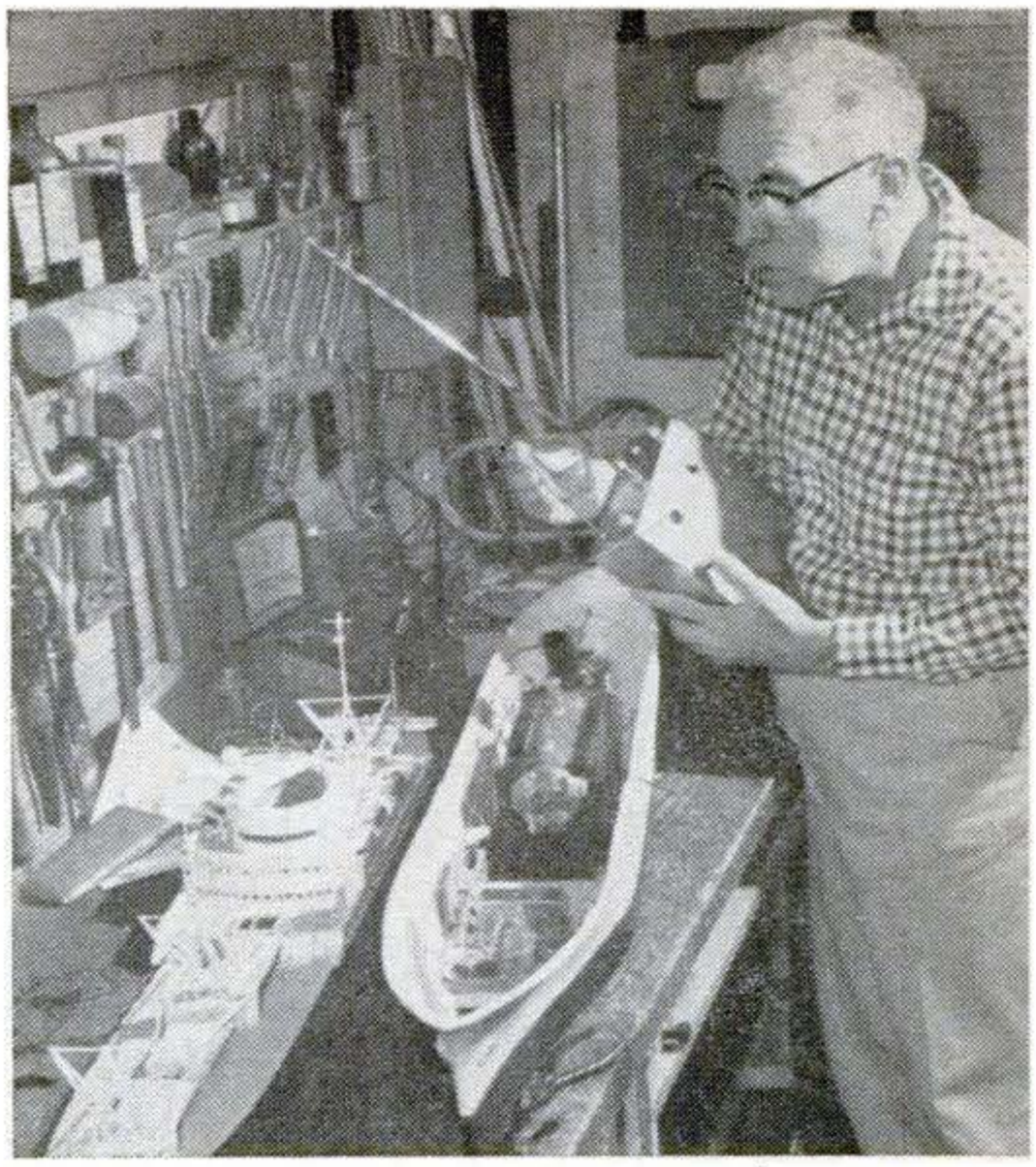
Copyrighted material

the antenna lead on the receiver. Solder this connection for good contact.

You can test the controls by having someone stand by the ship while you walk away with the transmitter. Call out your signals as you send them so the observer can check as they are received. To test the effective range, take the ship out of doors and send signals as you walk away.

Continue widening the gap until the observer reports that the servos fail to respond to the transmitter; then walk toward the ship until it again responds. This will give you an idea of the limit of your control and prevent accidental loss of the priceless model.

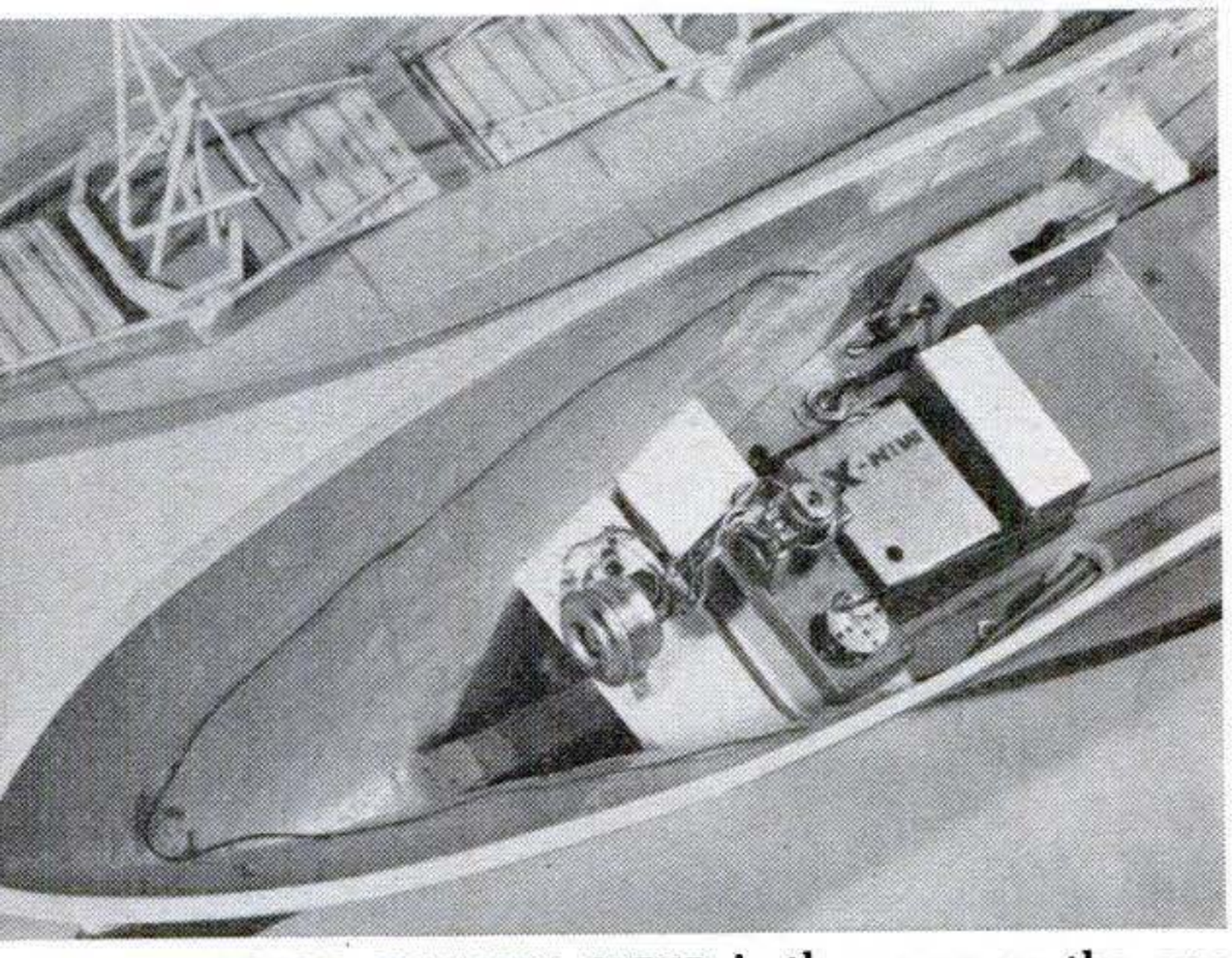
Although the transmitter and receiver are tuned at the factory, retuning sometimes brings a slight increase in range. Any high-impedance earphone can be plugged into the tuning jack to tune for the loudest tone. Instructions for tuning are included with all R/C outfits. Save them for future reference.



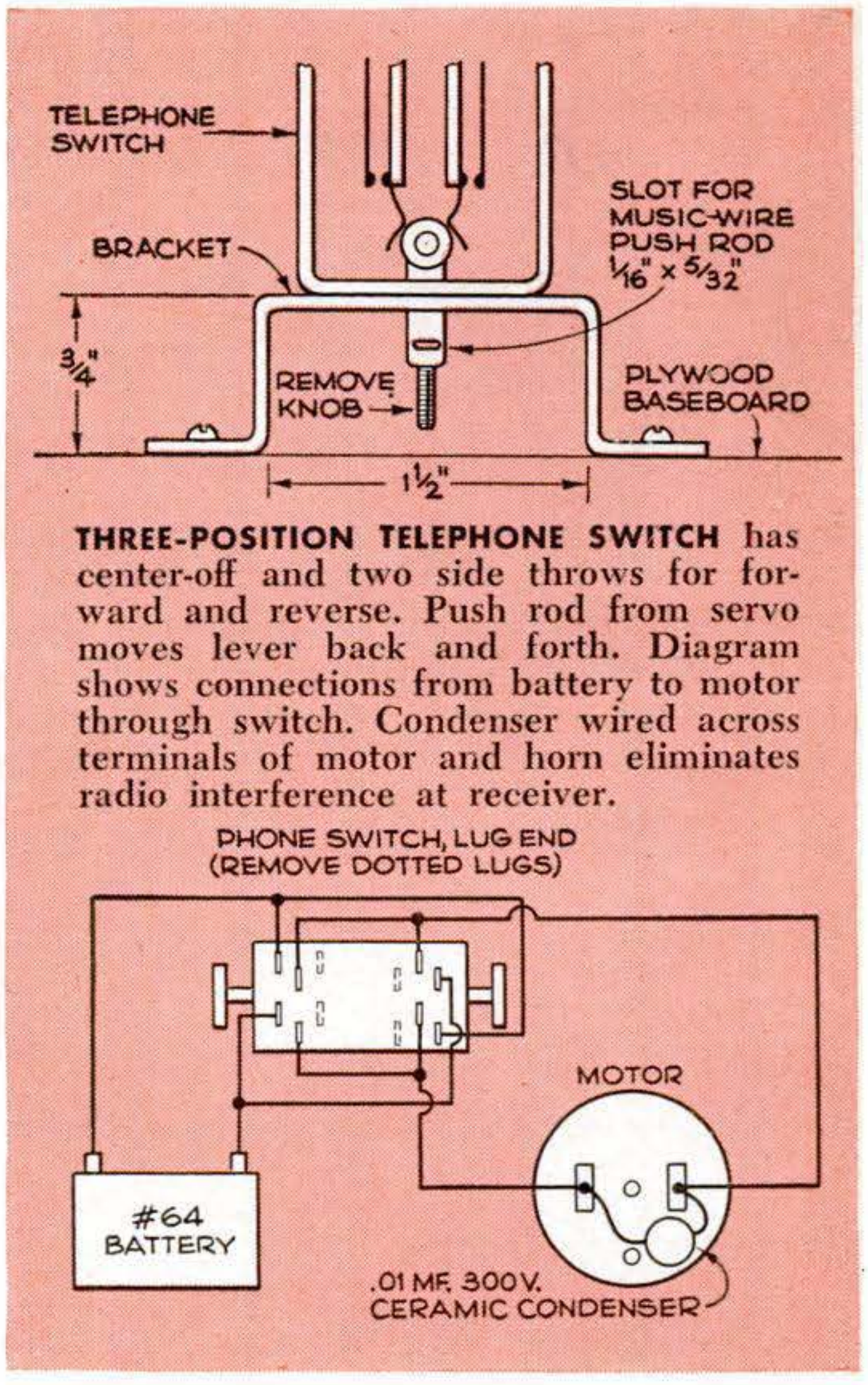
**CHECK RADIO CONTROL** before putting the ship in water to be sure of positive response and sufficient range. Here McEntee is tuning transmitter for strongest signal. Rig shown has four tuning screws at the top of the case.

# Drive Your Model

connected to the fourth channel relay. Keying the transmitter actuates the relay and closes the circuit to blow the horn without need of a servo. Lights can also be controlled by the relays.



**RADIO-CONTROL SETUP** is the same as the one used for steam installation, except that only one rotary servo is used to control the motor. A small horn, installed in place of a second rotary servo, can be blown by keying the transmitter to close the relay that controls the horn. Rudder control remains unchanged.

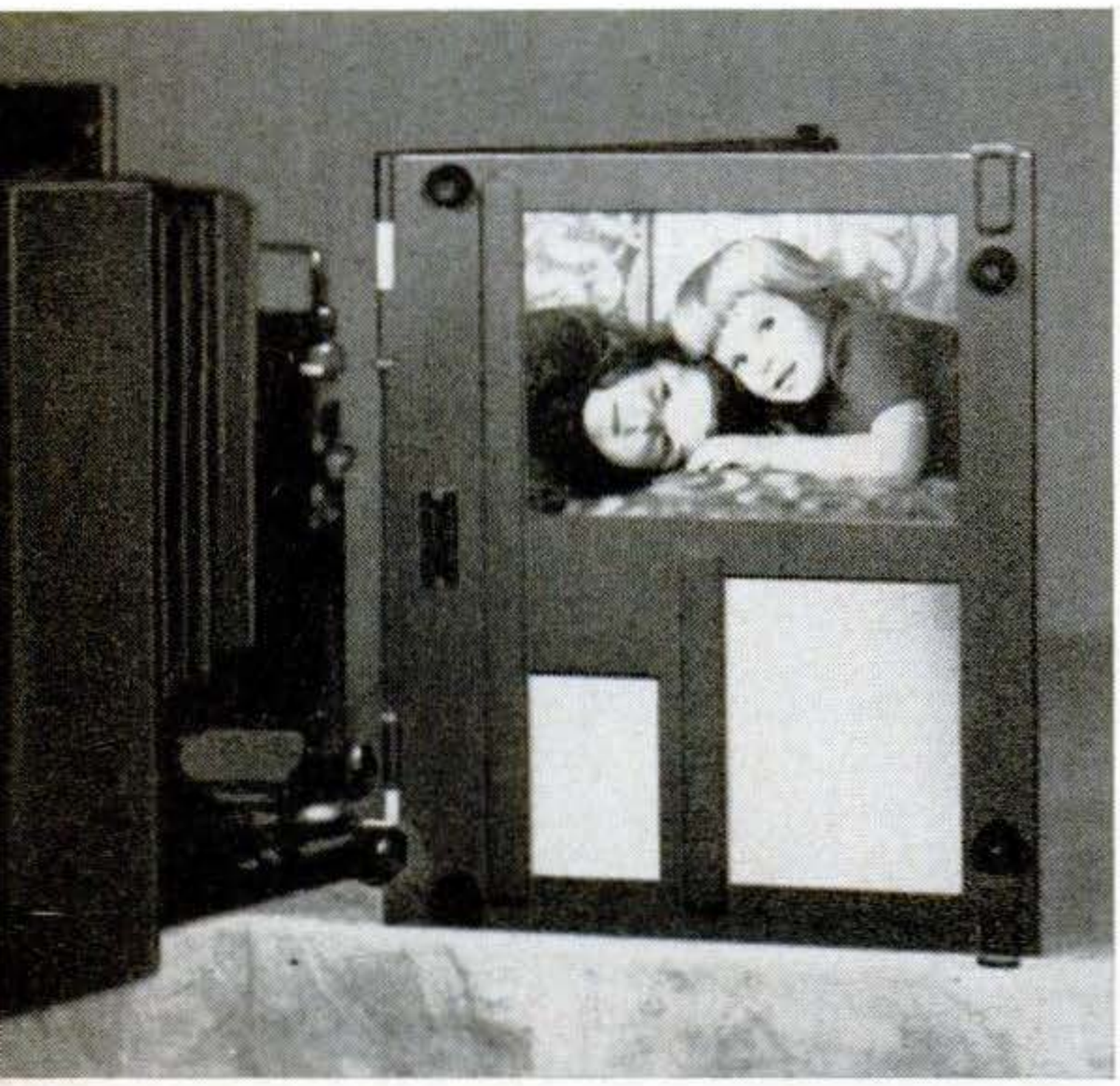



**THREE-POSITION TELEPHONE SWITCH** has center-off and two side throws for forward and reverse. Push rod from servo moves lever back and forth. Diagram shows connections from battery to motor through switch. Condenser wired across terminals of motor and horn eliminates radio interference at receiver.



Copyrighted material.

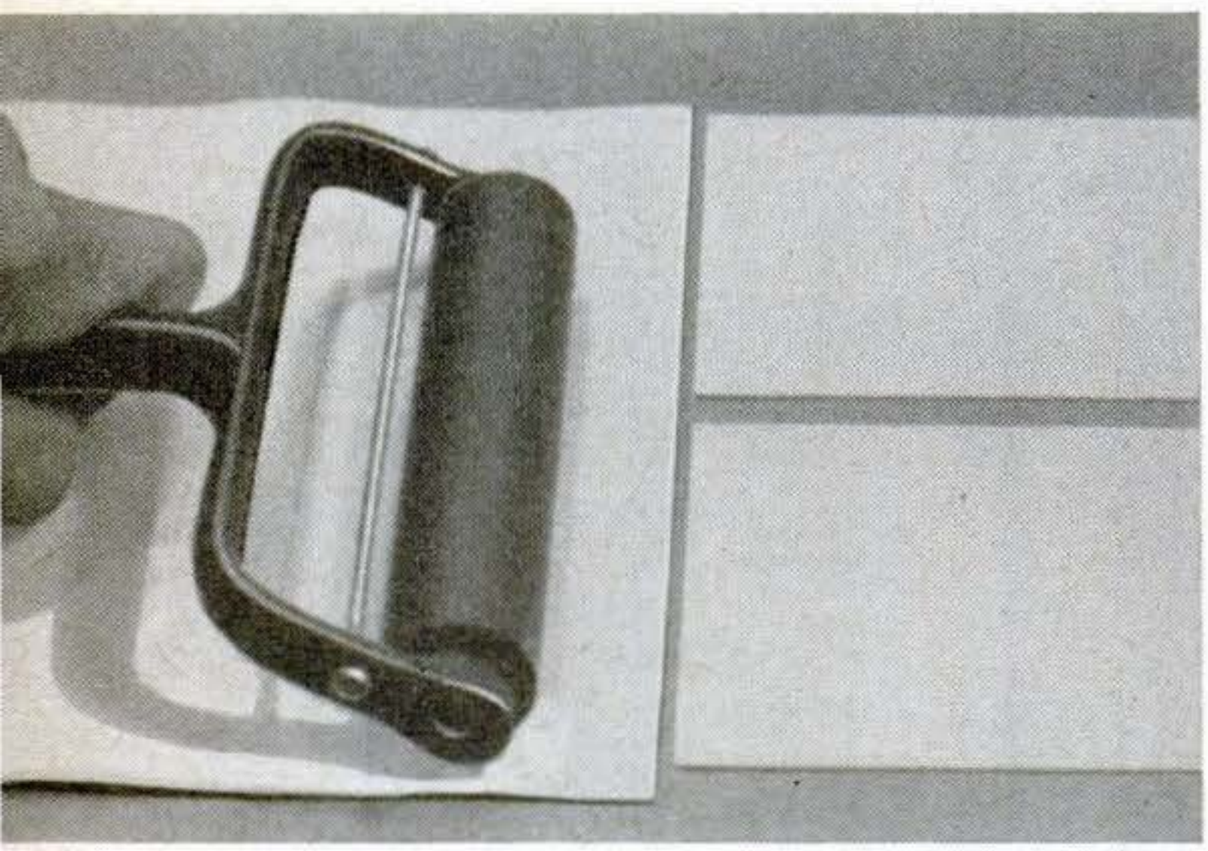
# Short Cuts for Camera Men



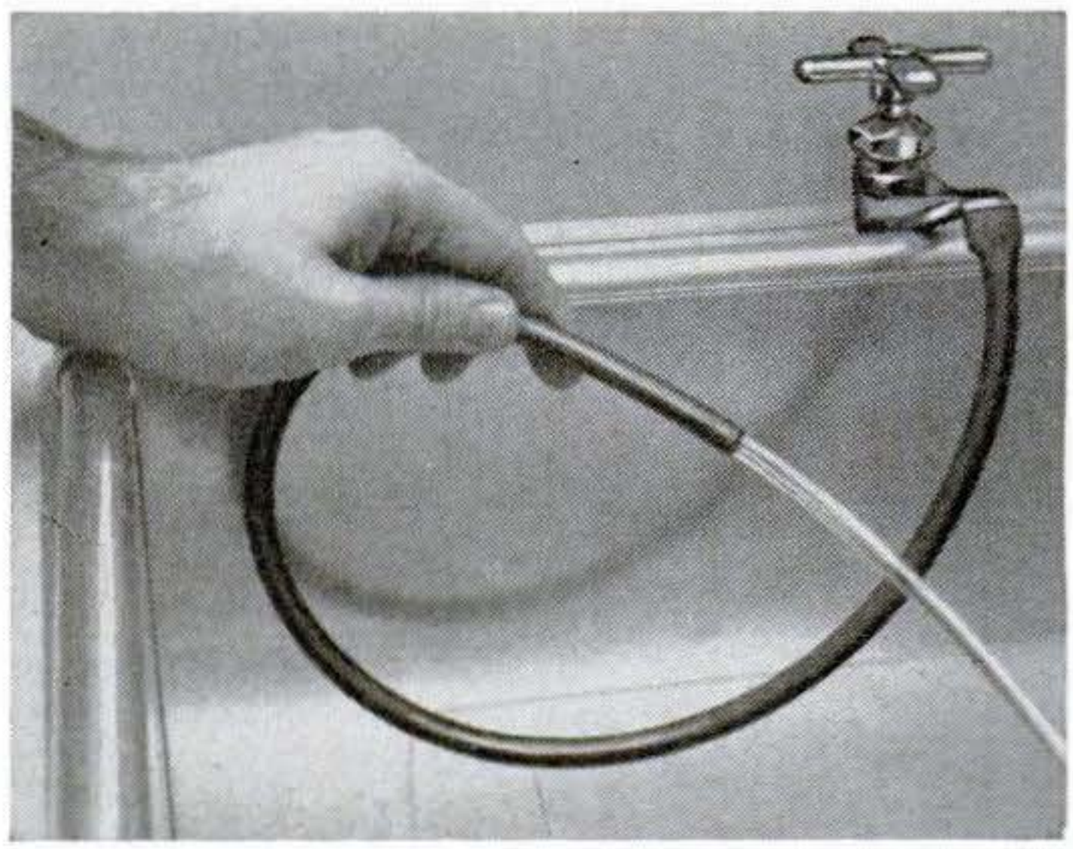


**MIXING MAKESHIFT.** When a large-mouth container isn't available for mixing chemicals, you can do the job with an ordinary bottle and a few marbles. Just drop in the marbles and shake the jar.—*Wayne Floyd, Fayetteville, Tenn.*

**COPY HOLDER:** An easel doubles nicely as a copy holder. Or at least the type shown at left does. The opposite (8-by-10) side is opened to hold the easel up straight. Reverse it for a larger print.—*W. D. McAllister, NYC.*



**SHORT OF TINS?** Ever print a large batch of glossy prints and find you haven't enough ferrotype plates? Roll the extras on a plastic kitchen-table top. Wax and polish the top first. —*Robert Micals, Freehold, N. J.*

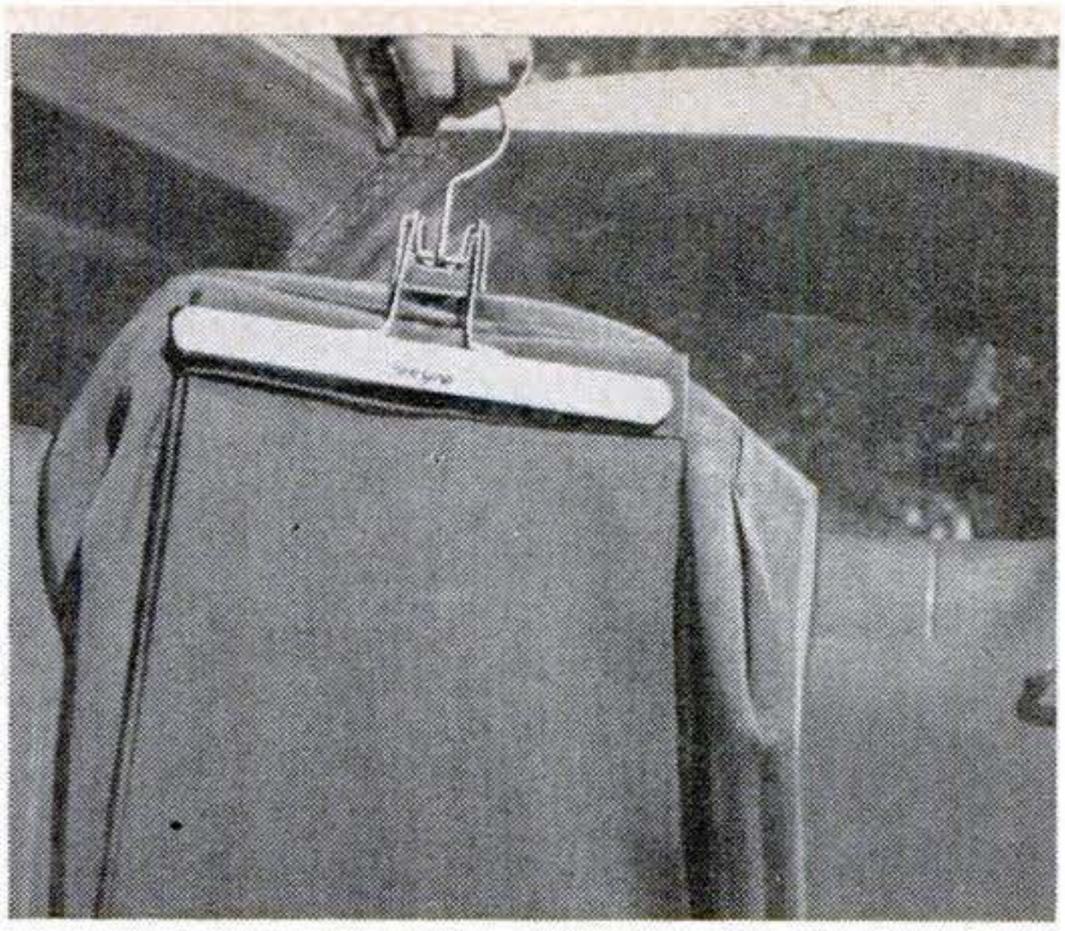


**FAUCET HOSE:** A piece of ⅜" syringe tubing from a drugstore makes a fine hose for a darkroom sink. It can be slipped into the center of many developing reels for washing film.—*Joseph R. Noonan, Burlington, Vt.*

**SWITCHING TITLES THE EASY WAY:** It pays an amateur moviemaker to own a collection of hardware-store metal letters and a choice of spray enamel in cans. That way it's easy to make new titles and even change color if desired.—*Arthur R. Tanner, Poughkeepsie, N. Y.*

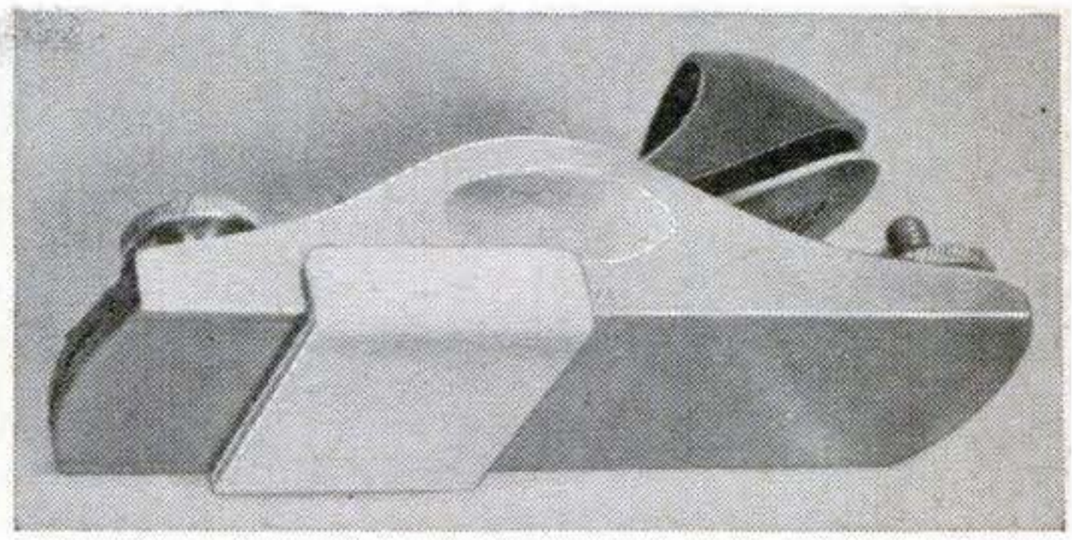
Copyrighted material

## Short Cuts and Tips
FROM PS READERS



### Creaseless Pants Hanger

TROUSERS carried in a car on an ordinary hanger end up with a sharp crease across them after a long trip. Avoid this by using a clamp-type hanger and clipping both cuffs and waistband. The pants will fold softly without creasing.—*Wesley C. McDonnell, Vancouver, Wash.*



### Guard Protects Plane Blade

A PLANE banged around in a tool box with the blade exposed is sure to be damaged. You can protect the blade with a tight-fitting clip bent from 1/16″ aluminum or brass. Pad the inside with cork or felt and soak it with oil to prevent rust. —*Robert Micals, Freehold, N.J.*

# My Most Embarrassing Shop Moment

BOY, was I cocky! I had just finished my training as a streetcar operator, was sporting a smart new uniform, and looked—I was sure—like a million bucks.

Pulling out of the car yard on my first run, I noticed that the doors had failed to close. I pushed every button I knew and still they wouldn't close. I had to stop the car in the middle of the street and try to move the doors by hand.

They were double swinging doors, and as I gave them a yank they suddenly sprang at me. Before I could move, they had closed right around my neck. I couldn't move in or out. I was trapped.

My new cap fell in the mud. Crowds gathered. Finally, some people were able to pull the doors apart and let me out. The commotion had brought all my fellow operators and mechanics from the nearby yard and they were howling.

Luckily, the mishap didn't cost me my job, but I've been taking a stiff ribbing for years. Only now is it beginning to seem funny.—*William Bunton, Detroit.*

*Do you have an embarrassing shop blunder that haunts you? PS will pay $50 for each such experience published. None can be returned. Keep it brief. Address: Shop Editor, Popular Science Monthly, 355 Lexington Ave., New York 17, N. Y.*



Copyrighted material

# Putting an Electric

**By Sanford Maizel**

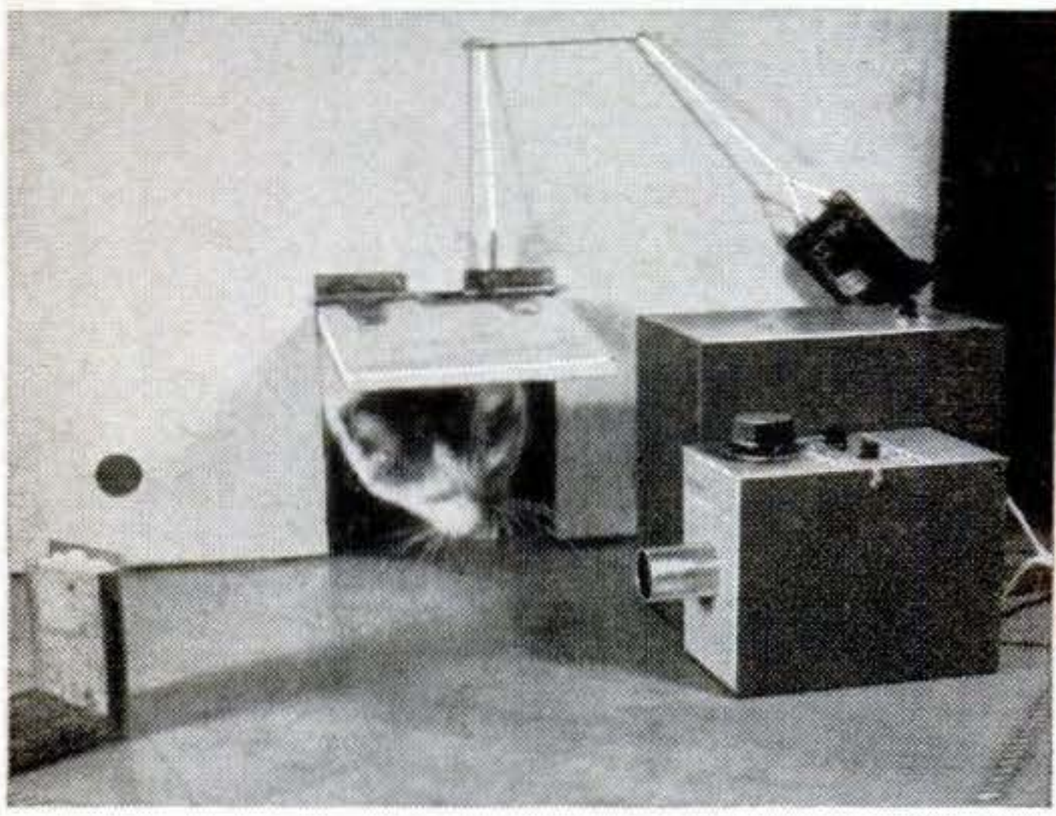
NOTHING can give more scope to your ingenuity than a photoelectric relay. It can solve control problems in your most fanciful labor-saving schemes with an elegance that will delight the most gadget-loving soul—and prove reliable enough to fend off wifely skepticism.

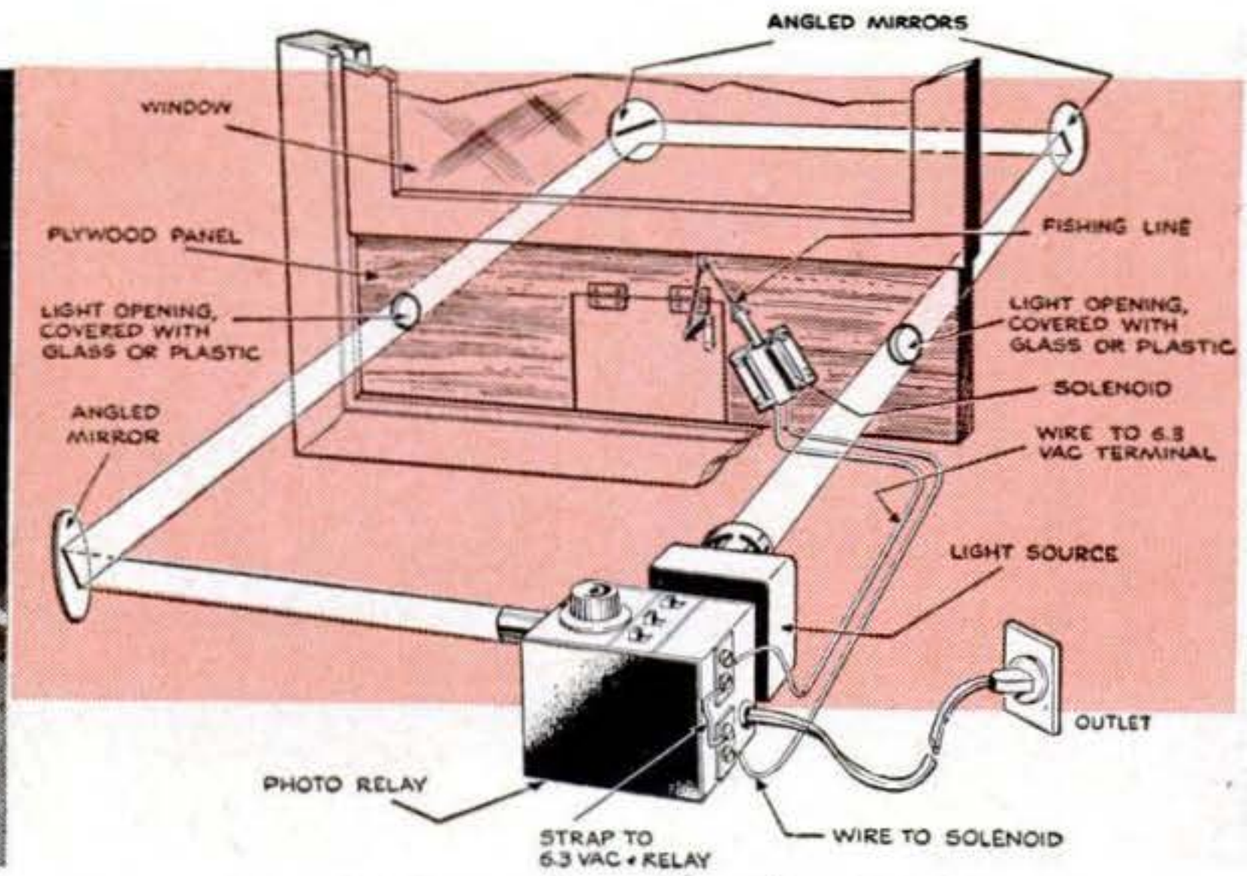
New developments in photosensitive devices have made possible the design for home use of photo relays that are more attractive than ever. One such is a kit-built job sold by Allied Radio (Knight Kit 83Y702, $12.95). It's designed around a tiny cadmium selenide photocell smaller than the eraser on your pencil. It's far more sensitive and requires less associated circuitry than the familiar tube-type photocell.

The kit makes a complete light-operated switch, plus a low-voltage power supply for direct operation of such things as bells and alarms. Also, connections to relay contacts are accessible for switching up to 1.5 amps at 50 volts AC from an external power source.

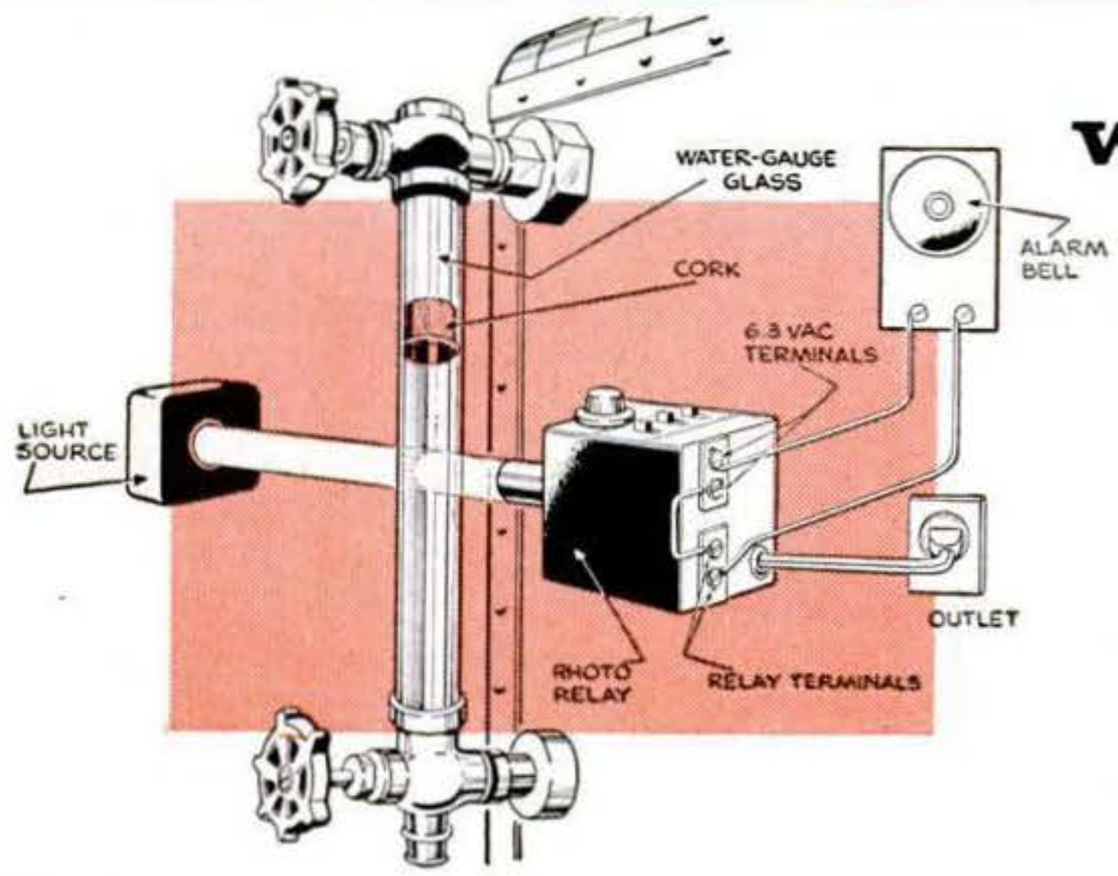
For switching 115 volts AC, you'll need an external relay. For convenience and safety, it's best to mount a power relay in a utility box and provide a stand-

## PET DOOR OPENER






**THIS TIME AND TEMPER SAVER** was installed in a plywood panel about 12″ high, cut to fit the width of a ground-floor window. The hinged door is about 6″ by 6″. An "L" arm, fastened near the top of the door, is attached to a solenoid by a short length of fishing line. A four-sided light pattern is arranged so that the beam will be broken and the photo relay will then be tripped from either the inside or the outside of the window.




## WATER-LEVEL ALARM

**MOST STEAM-HEATING BOILERS** have a low-water cutoff to prevent damage to the boiler. But if you want a warning alarm that will remind you *before* the boiler water level gets critically low, you can easily rig one up.

Fit a cork loosely inside the water-gauge glass. Arrange a small light source on one side of the gauge glass and the photo relay on the other. Adjust the height so that the cork will interrupt the light when the water level drops. You'll have to mask the light source and photo eye to eliminate extraneous light. The alarm bell can be mounted upstairs.

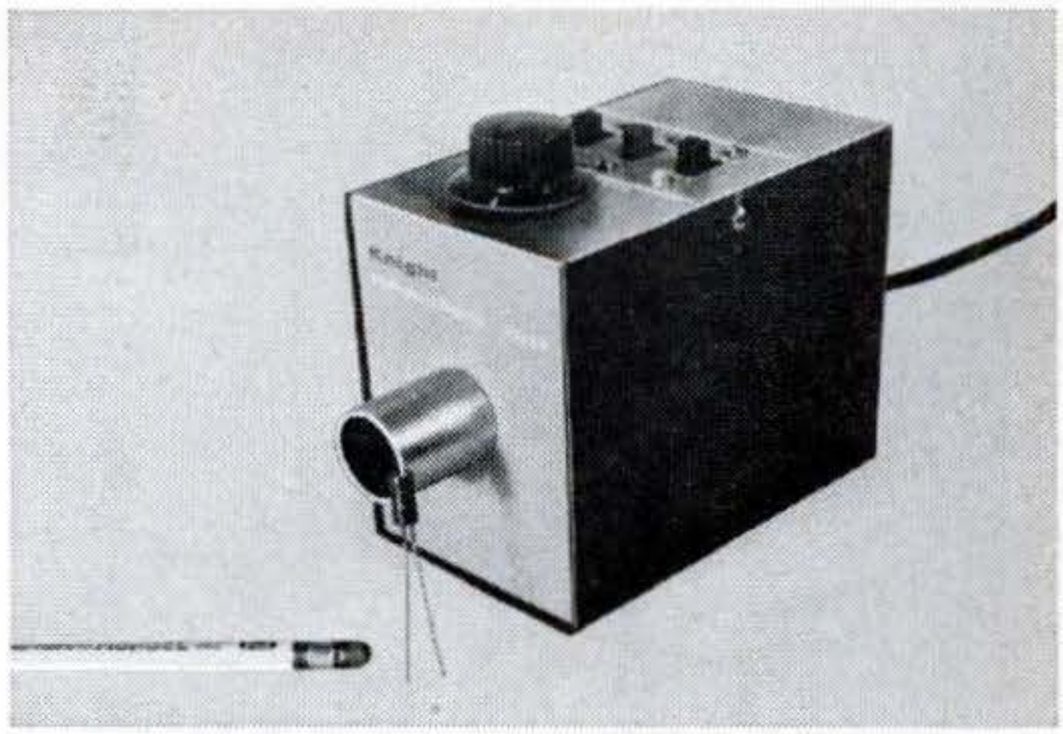


Copyrighted material

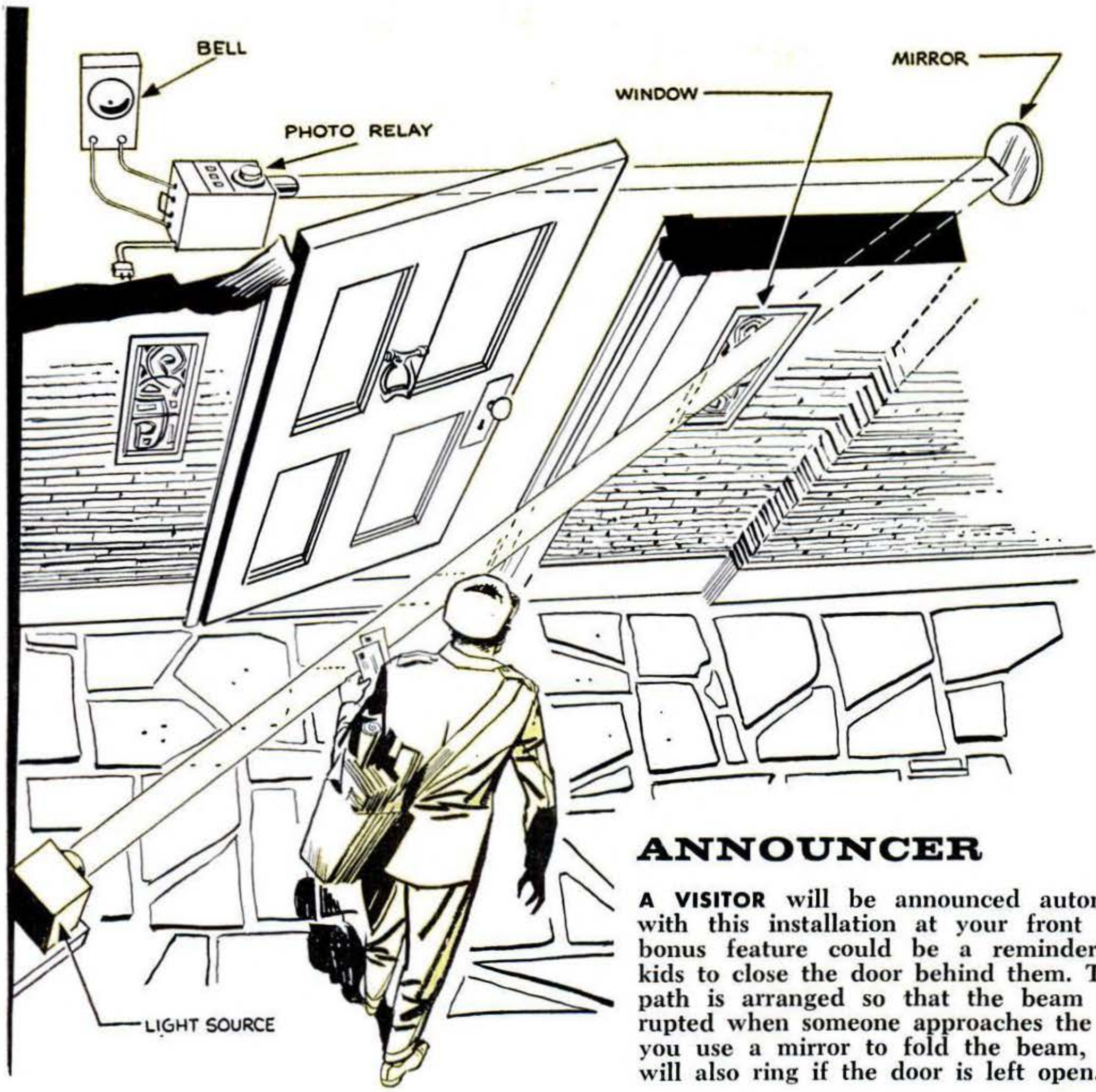
# Eye to Work

ard line cord and plug-in receptacle. A diagram in the kit manual shows how.

The circuit controlled by the photo relay is open as long as light falls on the photocell. It's closed when the light is interrupted. By proper connection of the external relay, the action can be reversed. The maker claims the photo relay will make up to 600 counts per minute and is sensitive enough to operate from one-quarter foot-candle of light. Power consumption is only three watts. You'll have your own pet project for this versatile electronic servant, but here—on these and the following two pages—are some ideas to start you on your way.



**KIT-BUILT PHOTOELECTRONIC RELAY** is completely self-contained. Tiny light-sensitive element is shown standing by shield. Knob on top adjusts sensitivity for varying light conditions.



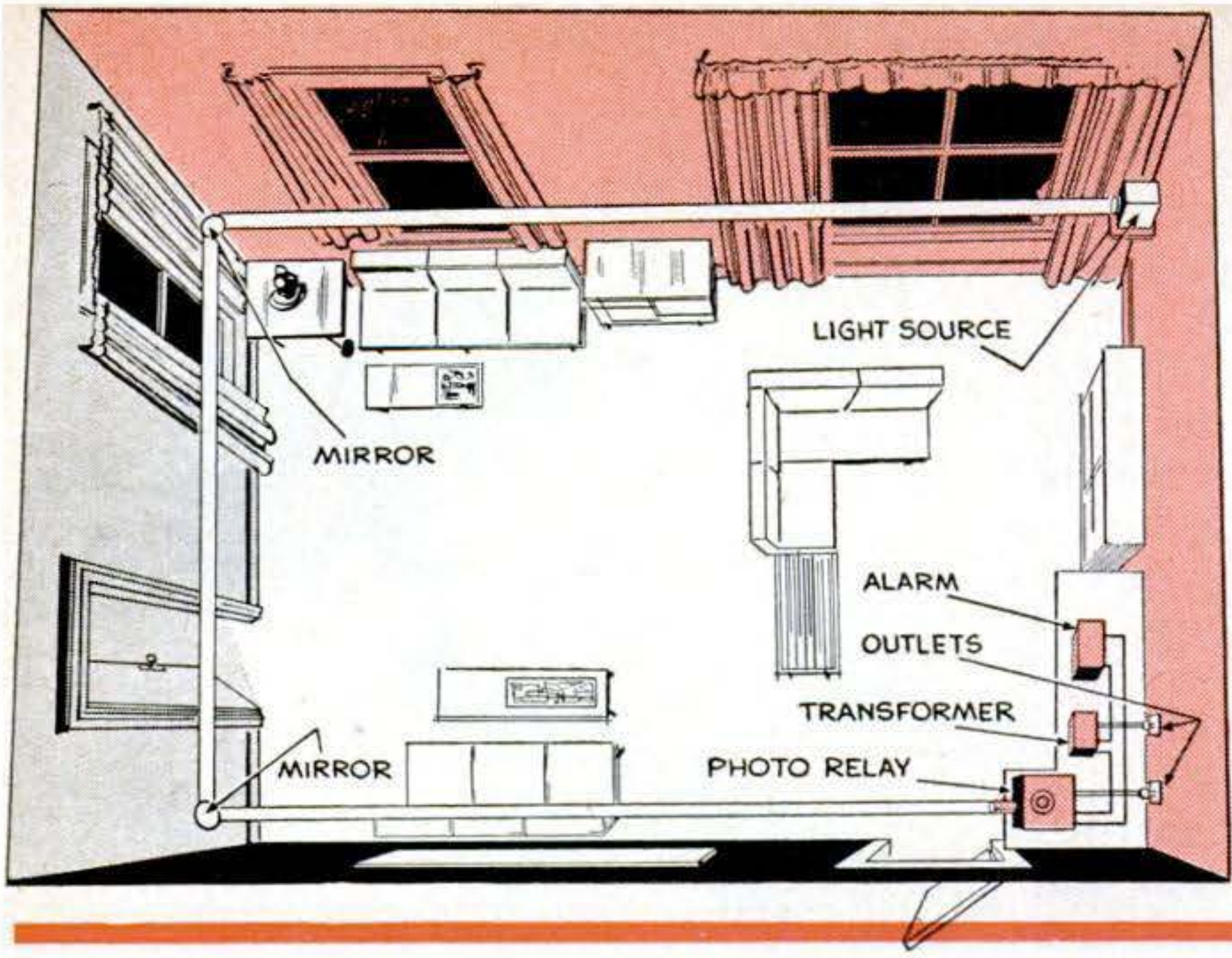

## ANNOUNCER

**A VISITOR** will be announced automatically with this installation at your front door. A bonus feature could be a reminder to the kids to close the door behind them. The light path is arranged so that the beam is interrupted when someone approaches the door. If you use a mirror to fold the beam, the bell will also ring if the door is left open.

CONTINUED



Copyrighted material

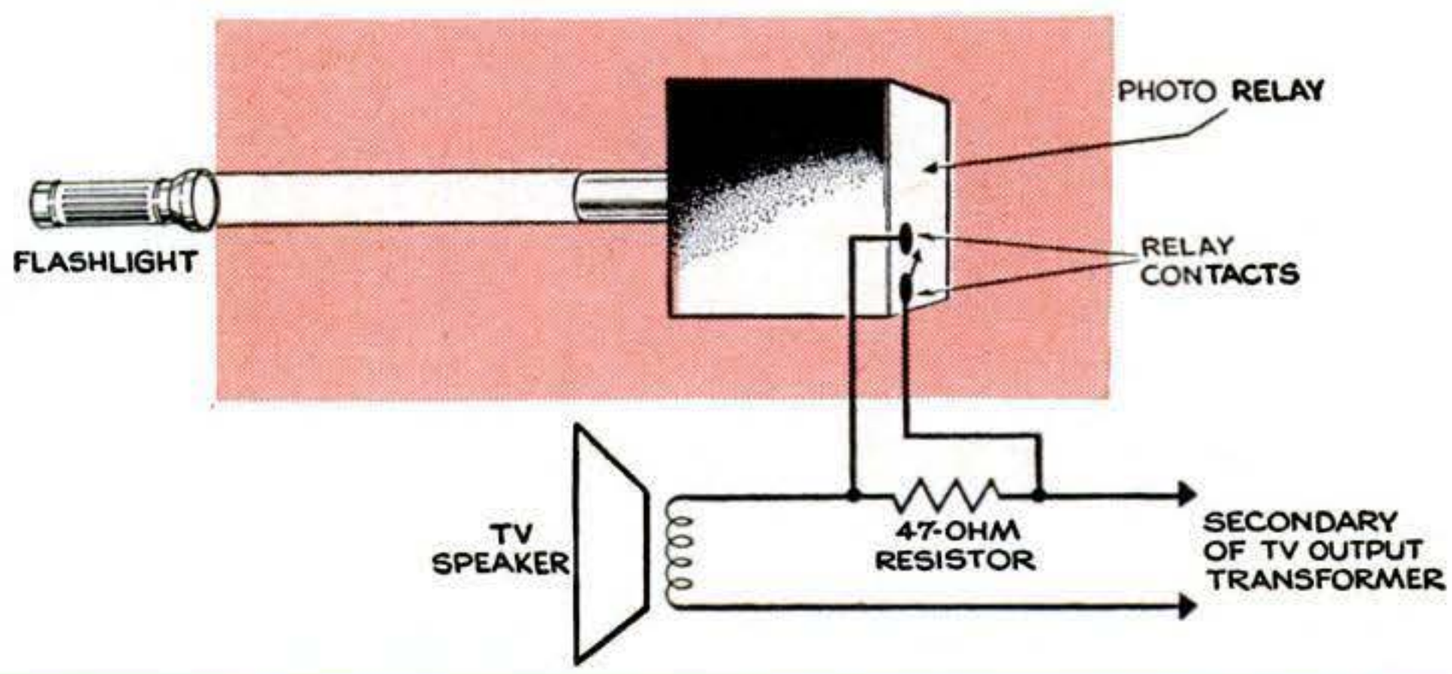



## BURGLAR ALARM

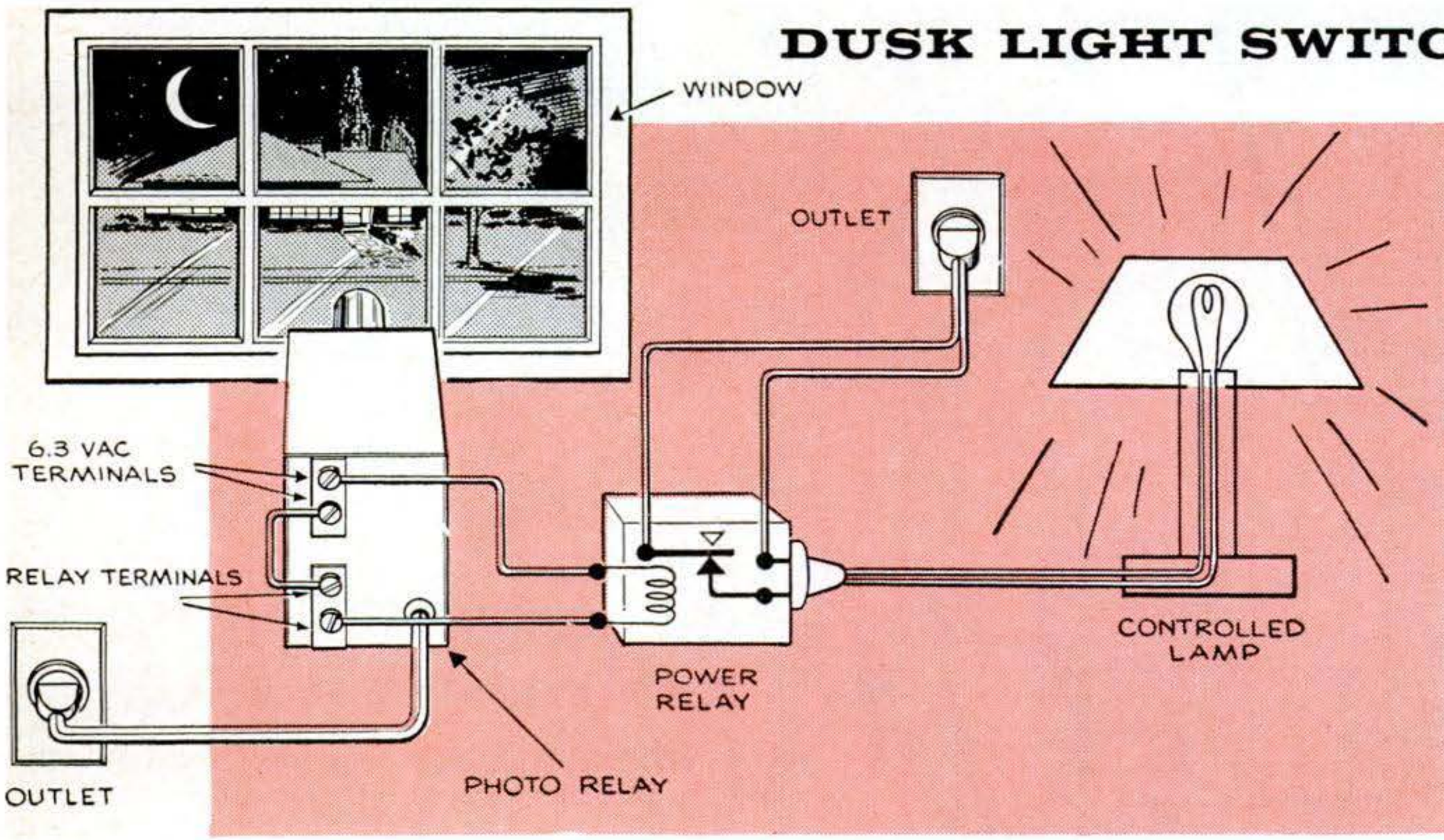
**A SIMPLE INSTALLATION** using a light source and the photo relay will ring an alarm if anyone enters the protected area. A light path that crosses all windows and doors is created by use of mirrors. The switch on the photo relay is set to *trip*, so that the alarm will continue to ring once the light path has been interrupted.

## TV-COMMERCIAL KILLER

**MOUNT A MAILING TUBE** over the relay aperture to exclude room light. Aim it toward your viewing chair. Adjust the sensitivity control until a flashlight aimed straight at it trips the relay. Connect a 47-ohm resistor in series with the speaker voice coil in the TV, and connect the relay as shown in the diagram. Now you can mute noisy commercials with the beam of the flashlight.




## DUSK LIGHT SWITCH




**BURGLARIES** occur far less often in homes that are, or seem to be, occupied. With the photo relay illustrated above it is a simple matter to have one or more lamps in the house go on at dusk and off again at sunrise—good protection when you're off on vacation. Just point the photo eye out a window, connect the power relay, and plug a lamp into it. Adjust the sensitivity knob so the relay operates at dusk and set the trip switch to *auto*.

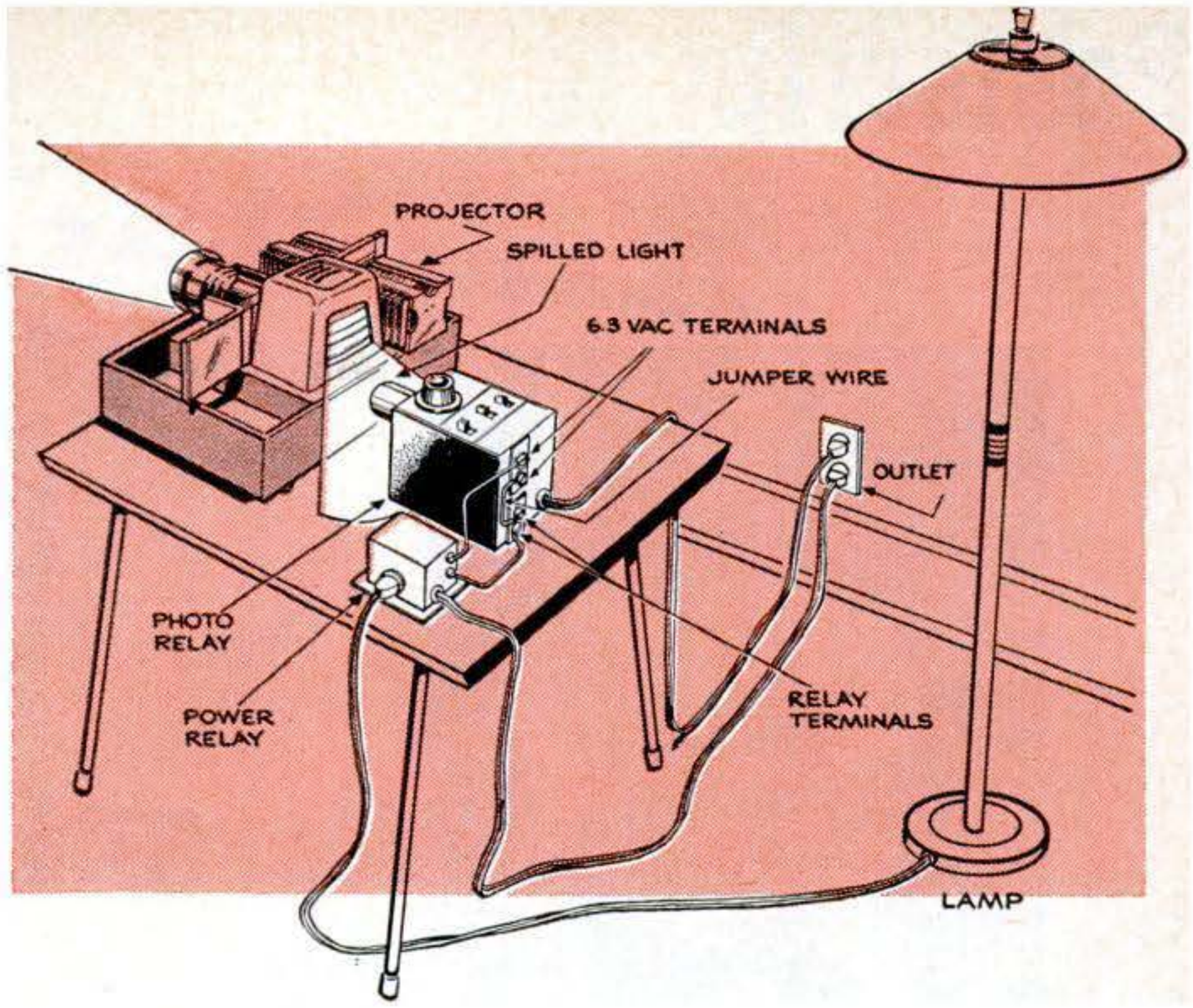


Copyrighted material

# PROJECTOR ROOM-LIGHT SWITCH

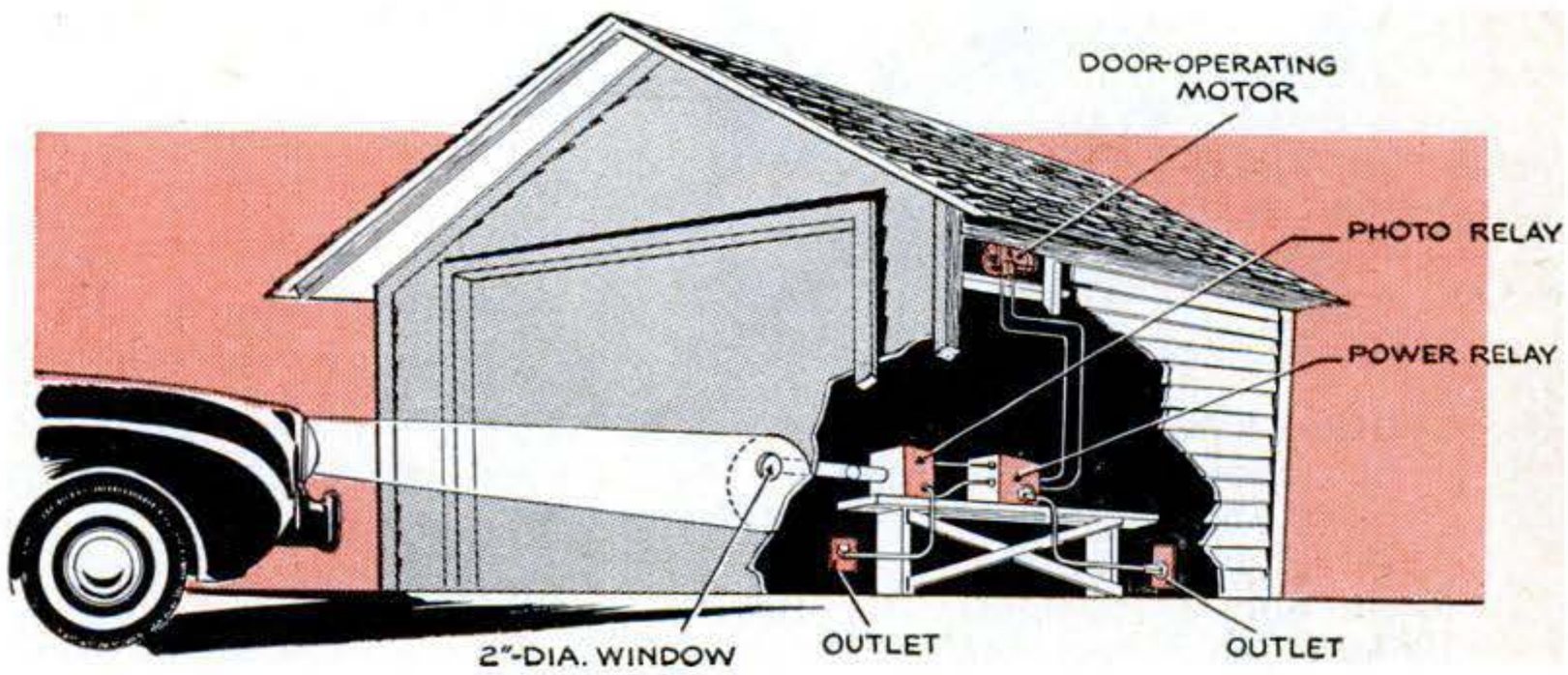
**SLIDE OR MOVIE SHOWS** for your friends are more fun if you can arrange for the room light to go out automatically when the projector is switched on, and come back on when the projector is turned off.

No special installation is needed. Just plug a floor lamp into the power relay outlet and position the photo relay to catch some of the light spill near the cooling vents in the projector-lamp housing.




# GARAGE-DOOR OPENER

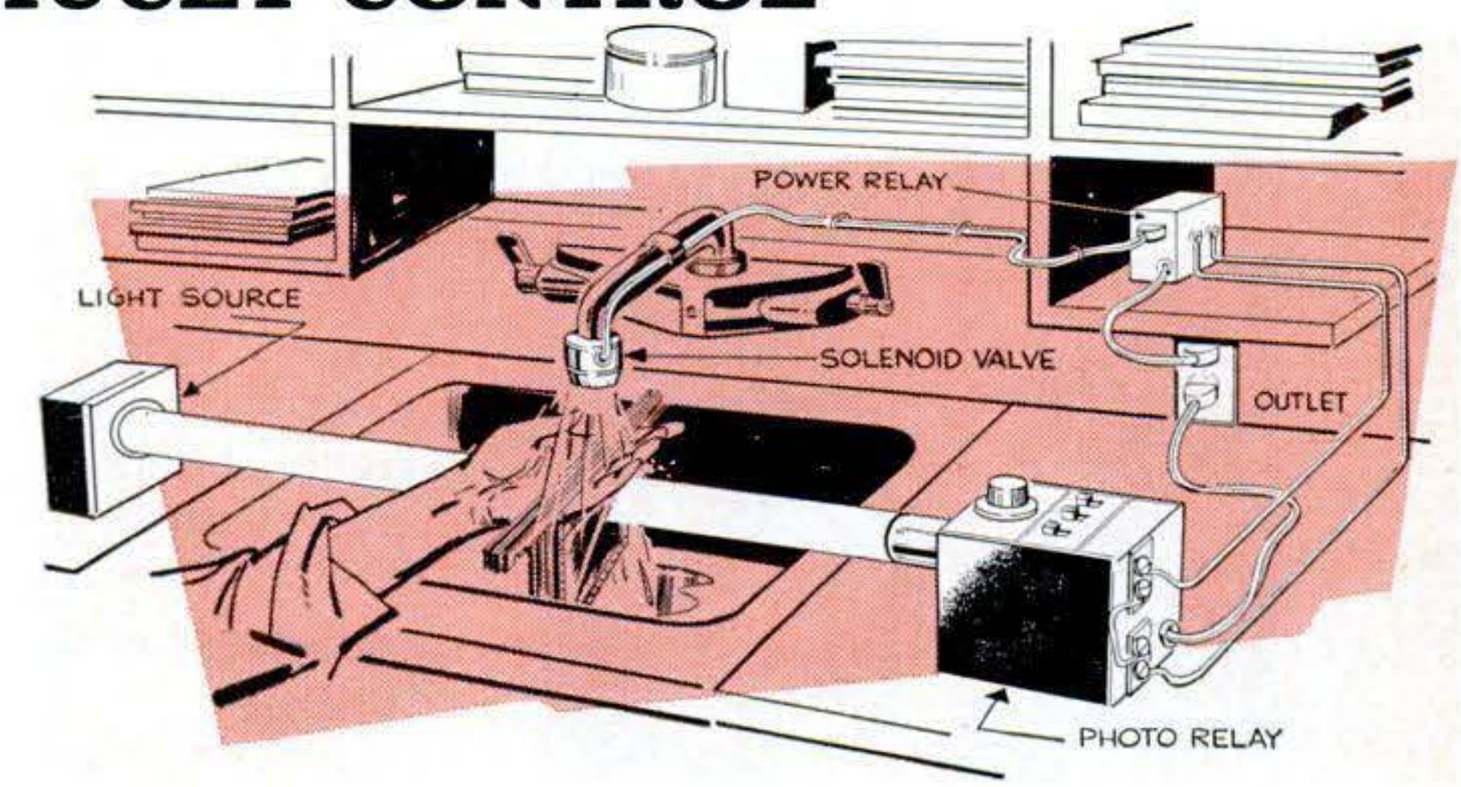
**YOUR HEADLIGHTS** will operate a motor-driven garage door and save you most of the cost of a radio-control unit. You'll have to experiment to find the best location for your particular setup. In general, you'll need to make about a 2"-diameter window in the door and position the relay so the beam from the headlights will reach it when the car is in a particular position. Since the low beam casts the headlights to the right, place the photo relay on a low shelf on the inside right-hand wall, as shown in the diagram. Use an external power relay that will handle the current required by the door motor. Connect the relay contacts so that the circuit to the motor is closed when light reaches the photocell. Use a length of mailing tube to limit the light reaching the cell to a narrow beam. Adjust sensitivity control until normal daylight will not trip the relay when the door is closed.




# AUTOMATIC FAUCET CONTROL

**THIS APPLICATION** will be equally useful at the kitchen sink or in the photo darkroom. Just hold a dish or batch of negatives under the faucet and the photo relay turns the water on for rinsing.

A light beam is aimed across the sink just under the faucet. A solenoid valve (Gould, Type M, ½" size, Nielson Hydraulic, Pelham, N. Y.) attached to the faucet opens when the beam is interrupted for washing.

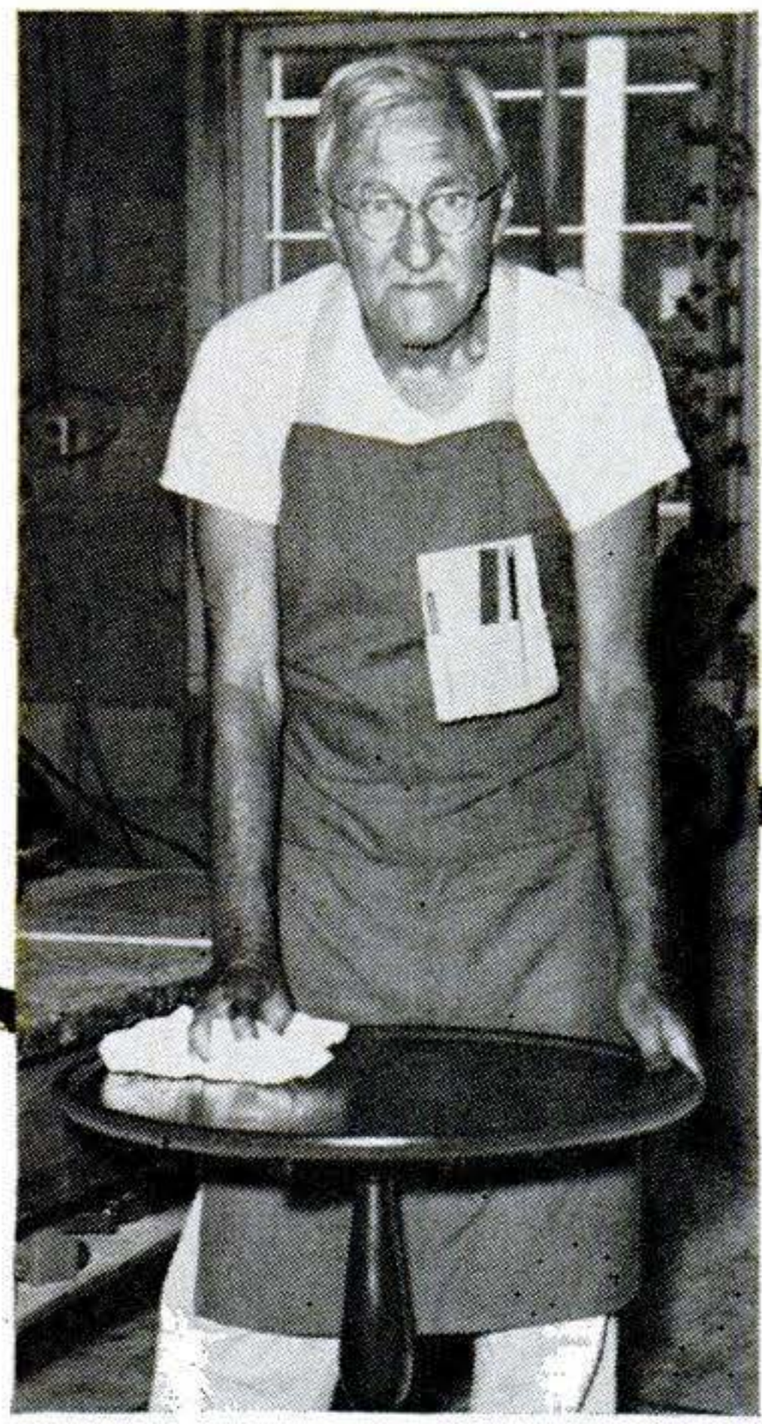





Copyrighted material

# Postscript to

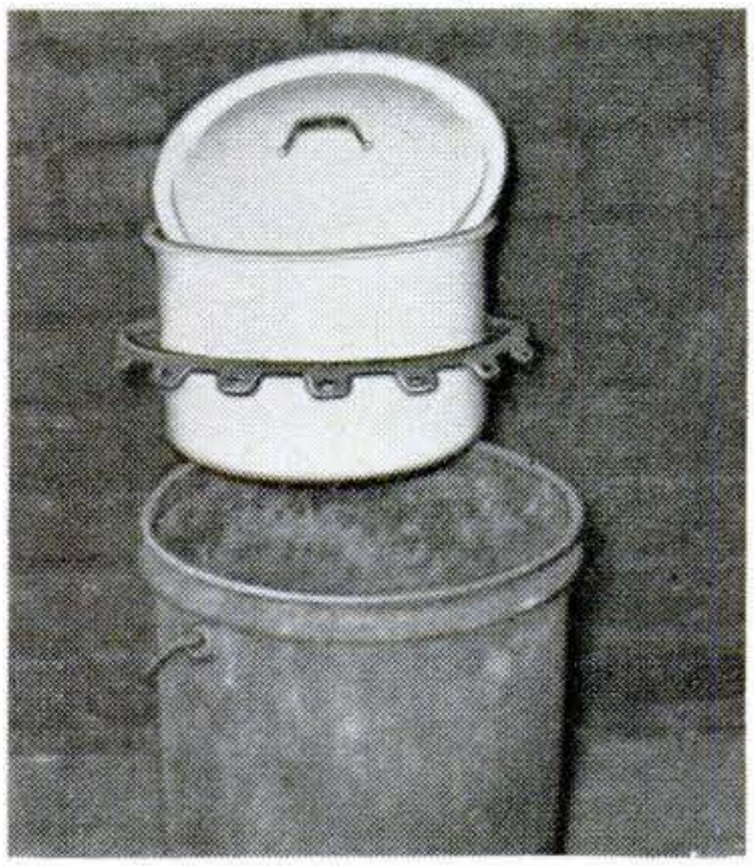
# An Old-Timer's Formula for Fine Wood Finishing



**OLD FAVORITE:** The photo and title above introduced one of the most popular articles ever published by PS. Now, because of continuing demand for fuller data about two points, we give you this postscript.

*The Editors*

**HOW THE AUTHOR DOES IT:** R. C. Stanley, shown at work above, has used the outfit below for years to boil linseed oil—a three-gal. enamelware lidded pot fitting in lid of a five-gal. steel drum. Boiling the water in the drum heats the oil in the pot.



**By R. C. Stanley**

SINCE my article on Wonderlux Wood Finish appeared in POPULAR SCIENCE [Nov., 1959], I've learned that one of the main elements, boiled linseed oil, is no longer easily available. As a result, many persons have had trouble with the finish.

They have told me that the specified solution of clear spar varnish, boiled linseed oil, and turpentine leaves a gummy, sticky surface on the wood, no matter how much they rub. This is a clear indication that raw linseed oil, with driers added, has been used—and not boiled linseed.

***Kettle-boiled linseed oil,*** also known as hard oil, has had the vegetable fats removed by boiling and is a much deeper color than raw oil. It used to be that kettle-boiled linseed was widely available. But what you get now as "boiled" linseed is usually just raw oil with driers added. The fats in it cause the sticky surface.

Boiling your own oil is the best answer. I've been doing it for years. It takes three to five hours, depending on the amount of oil you start with.

Place a quart or so of raw oil in a double boiler—more if a larger boiler is available. But don't fill the upper container too full. Keep the lid on and bring the water to a boil. Maintain maximum heat; keep the lid on and the water boiling. In about two hours the vegetable fat will begin to separate from the oil and rise to the top.

The floating fat first has a sickly white



Copyrighted material

color. It gradually darkens to an ivory color, indicating that all of the fat has separated and risen. The simplest way to remove fat is to siphon it off with a small rubber tube. Then pour off the boiled oil into its own container, one that you can seal. The residual oil in the double boiler is easily removed with hot water and soap if you act at once.

***A potash solution*** is the basis of the Wonderlux finish. Concentrated lye has been suggested as a substitute, but this should never be used. Crude potash (the wood lye our grandmothers used in making soap) brings out the wood's natural colors. It does this without burning the wood. Concentrated lye will bring out colors but will not develop a patina.

Pearlash was recommended in the original article as a substitute for crude potash, but this is no longer available in small quantities. This should prove no drawback, however. There is no difficulty in getting wood ashes. A bushel of ashes, thoroughly percolated, will make about 2½ gallons of potash solution.*

The leaching setup you need is shown in a drawing on the following page. Put ashes in the hopper and pour on water to wet them thoroughly. Then add more water to do the leaching, or dripping. Pour the same water back over the ashes twice a day, morning and evening, adding a little water each time. Continue this for from three to five days.

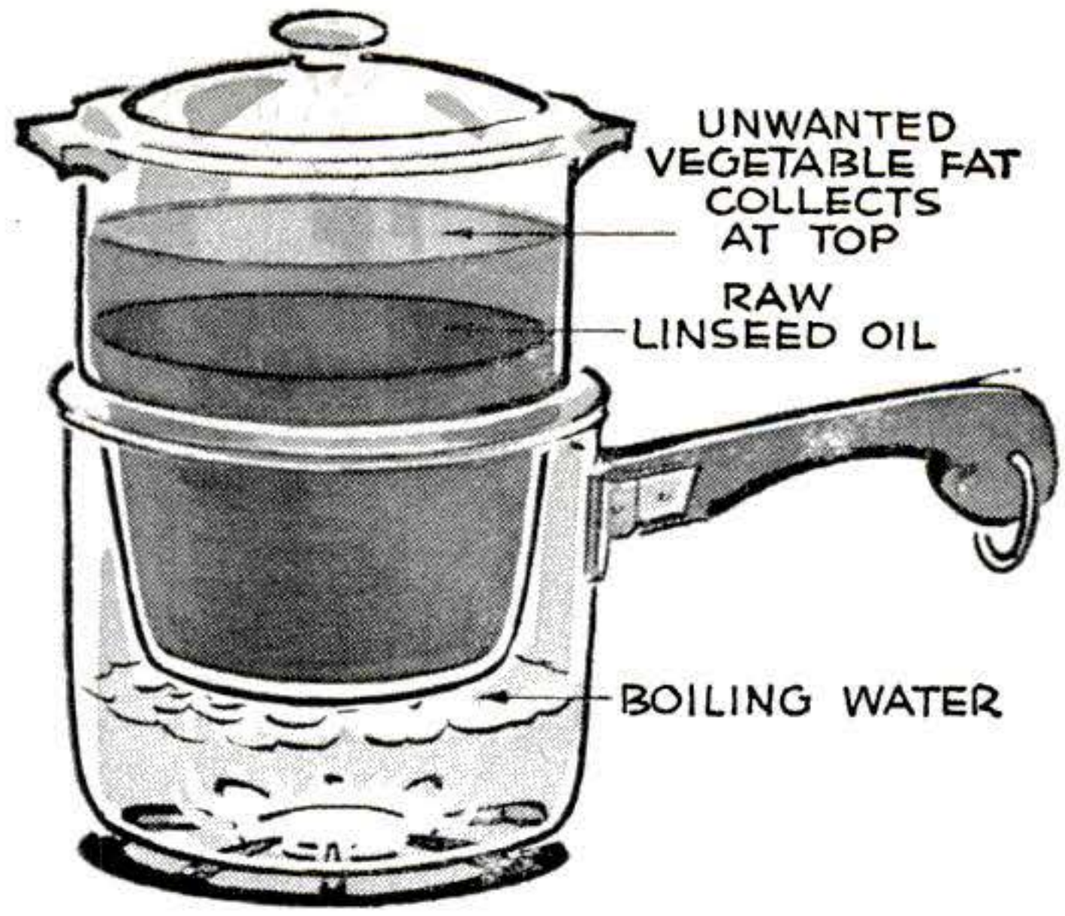
***Turpentine*** is the cure for a sticky surface left through use of the synthetic boiled oil. Scrubbing with turpentine also removes wax.

[*The text that follows is a condensation of Mr. Stanley's original article on his Wonderlux finish.*]

OVER the years I have developed a natural finish that brings out, in depth, all of the beautiful natural colors and shades of color in any dry wood. The finish also creates, in the comparatively short time of 2 to 12 months, a patina that equals natural aging of 100 years or more.

All woods contain varying amounts of albumin. A natural patina comes from a film of albumin forming on the surface. It is believed that a photochemical action draws the albumin to the surface.

**Crude potash, a caustic liquid, is not mailable by parcel post and is expensive to send by express. Mr. Stanley does not sell either potash or wood ashes.*




**HOW YOU CAN BOIL LINSEED OIL:** Use a double boiler on the kitchen stove to make a quart or so of boiled linseed oil. This is enough to keep you going for some time. Siphon off the white-colored vegetable fat that collects on the oil, using rubber tubing. Pour the remaining oil into its own container. The double boiler should be washed out at once.

The potash solution speeds up the process by combining with albumin and drawing it to the surface. It does this in days or weeks instead of years.

The patina forms more rapidly on most softwoods than on hardwoods. When the patina film has formed, chemists can find no difference between it and the film created by a century of use and exposure to light. Result: the same mellow coloring of wood grown beautiful with age.

My Wonderlux is about the least expensive finish I know of, but it does require time and elbow grease, lots of it.

Any previous finish must be removed, preferably by scraping lightly. Parts that are difficult to scrape may be cleaned with varnish remover and a stiff bristle brush, followed by garnet paper or coarse steel wool, or both.

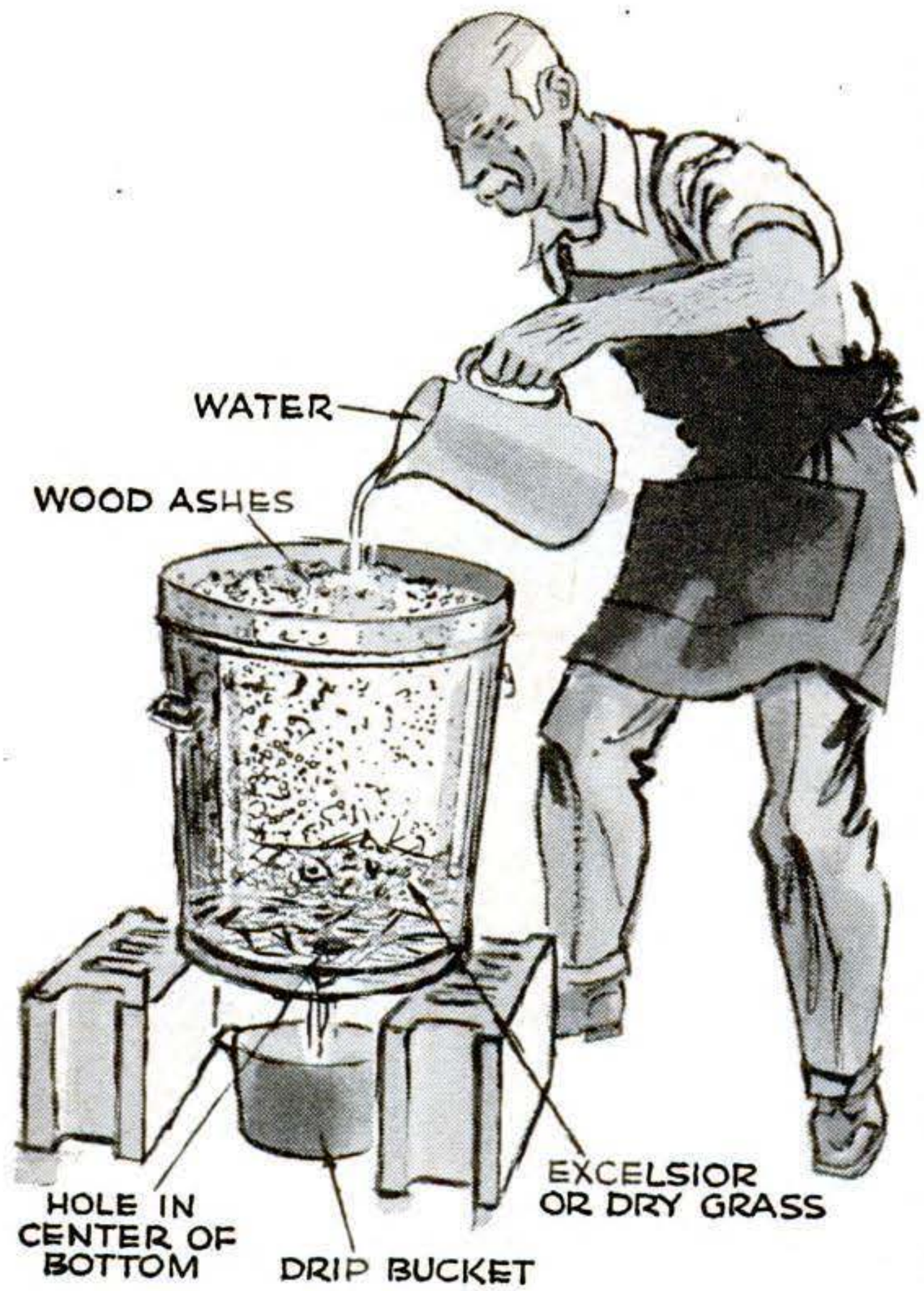
Wonderlux finish requires three separate operations with three materials.

***Step 1.*** The first material to be applied to the wood is a mild solution of potash in water. Crude potash, obtained by leaching wood ashes, is preferred. For the hard, close-grained woods, the solution should be somewhat stronger than for soft, more porous wood. (Do not put the solution in a plastic or aluminum container.)

The potash solution may be applied with a paintbrush. I wear rubber gloves

CONTINUED


Copyrighted material




**HOW TO MAKE POTASH SOLUTION:** Leaching wood ashes with a setup like this will give you all the potash solution you need for the wood-finishing formula. For the ash hopper and drip bucket, you can use any metal except aluminum. You can also use a wooden hopper and a glass drip bucket—but don't use plastic. Excelsior holds the ashes in the container.

(it discolors the fingernails otherwise) and rub the solution into the wood with a cotton rag. The aim is a uniform saturation of the wood surface with as much penetration as possible. The solution will cause only slight discoloration of the wood surface. Hardwoods should be given a second application after the first is thoroughly dry, and allowed to dry from 4 to 10 days.

Since wetting the wood surface will have raised the grain, you will need to remove the fuzz. Do this with very fine garnet finishing paper or fine steel wool. Wood treated only with the potash solution will show the greenish-yellow film of patina in a few weeks or months, depending on the wood. Frequent rubbing down with a dry cotton rag is an excellent substitute for use. An additional application of the solution after a few weeks will help, too.

***Step 2.*** In from 2 to 10 days (depending on the hardness of the wood) after applying the potash solution, put on the first coat of the final finish. This consists of equal parts of a good grade of clear spar varnish, kettle-boiled linseed oil, and turpentine—preferably distilled spirits of turpentine. The turpentine is a thinner. If the mixture seems too heavy, add more.

Rub this mixture into the surface of the wood with a well-washed cotton rag free of lint, such as an old shirt; new cloth is not suitable because of lint.

Dip the cloth into the developing mixture, then squeeze it out until it doesn't drip. Rub the wood briskly with the saturated rag. Replenish the rag as needed.

When the mixture has been rubbed in thoroughly, squeeze the rubbing rag as dry as possible and rub down the surface until it looks dry. This application may be repeated in a few days if desired, after removing any excess varnish with fine steel wool. Always remove all excess varnish—that which was not rubbed into the wood—before applying wax, the final coat of the finish.

***Step 3.*** For this, use good floor wax. But be sure the wood surface suits you, for nothing will follow wax. The first two or three waxings, several weeks apart, should be paste wax, rubbed in thoroughly. Thereafter liquid wax is good if preferred.

Note that I stress that all the finish is to be thoroughly rubbed into the wood. This is important. Any residual oil or varnish detracts from the finish.

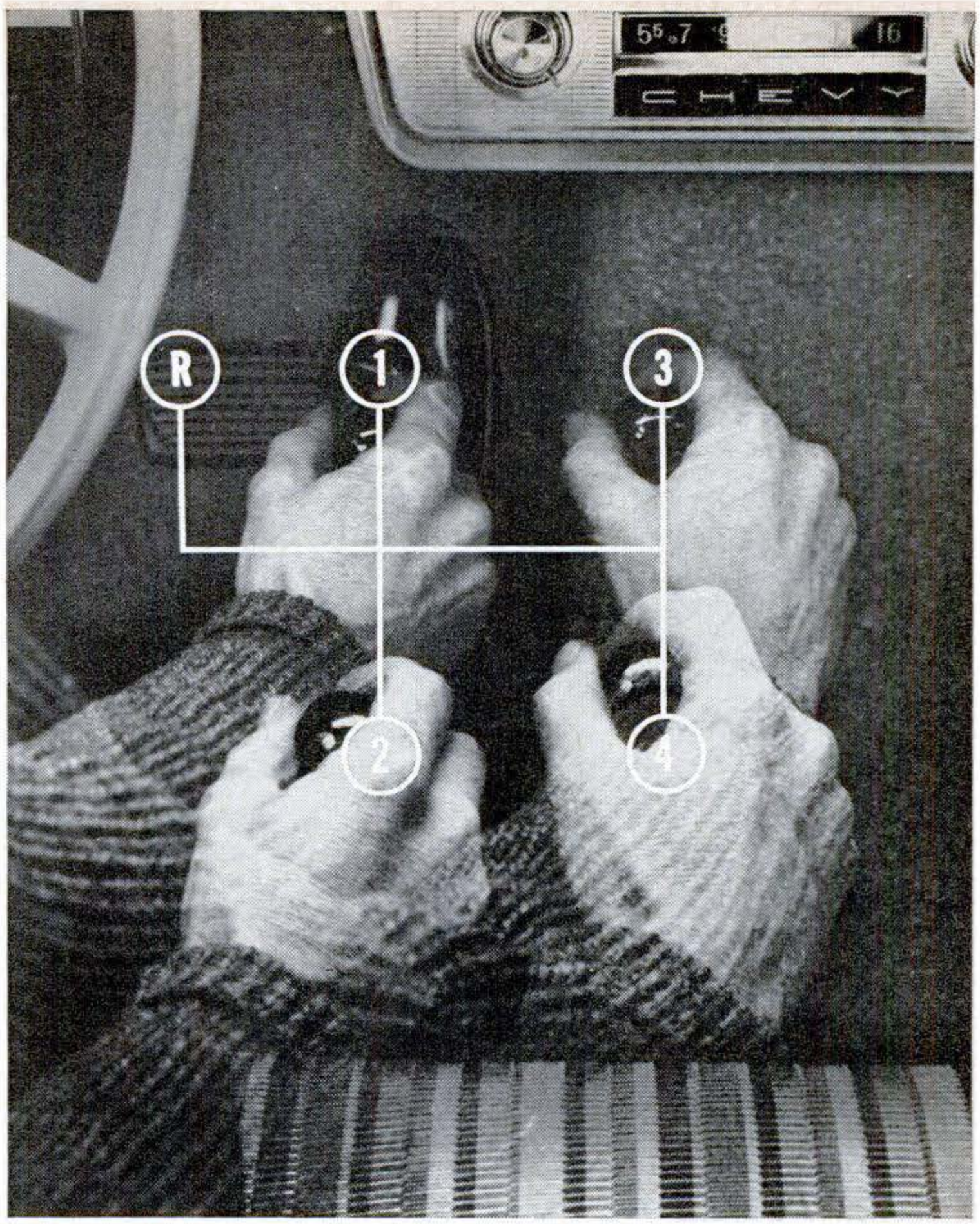
It often happens that two kinds of wood are used together, one much darker than the other. If desired, a small amount of dry powdered umber may be added to the potash solution for the light wood. Raw umber is yellowish brown. Burnt umber is reddish brown. Either of them will add color to light wood and will appear as natural color, not as stain.

Wonderlux wood finish improves with age on any interior woodwork—furniture, walls, floors, or whatever. The only attention it ever needs is a light waxing every year or so. Frequent rubbing down with a dry cotton rag improves it. Walls, furniture, and other woodwork I finished years ago are now more beautiful than ever.



Copyrighted material

# '61 CHEVY CORVAIR: THREE TRANSMISSIONS

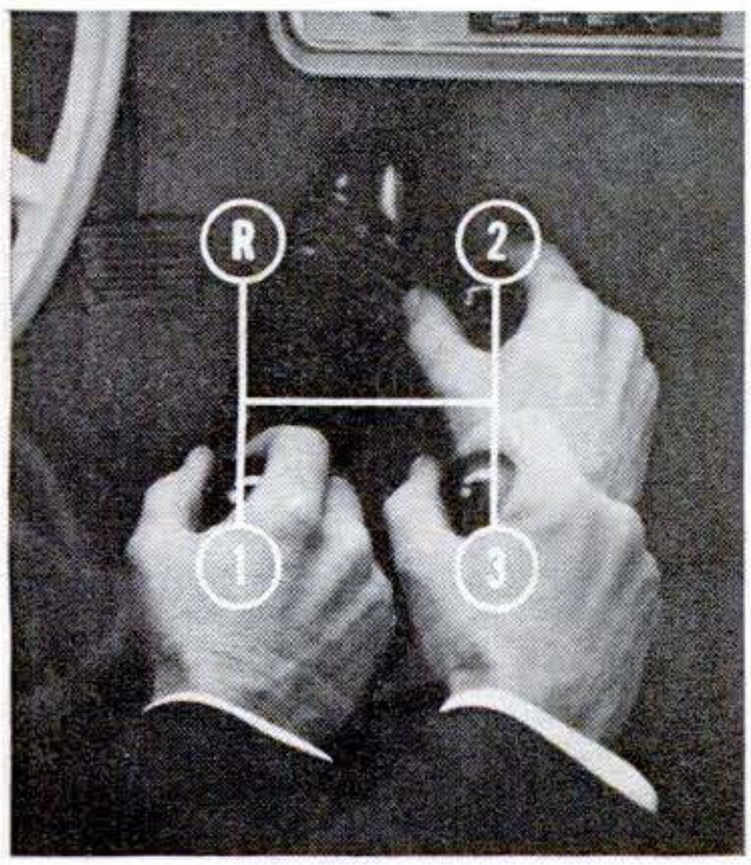


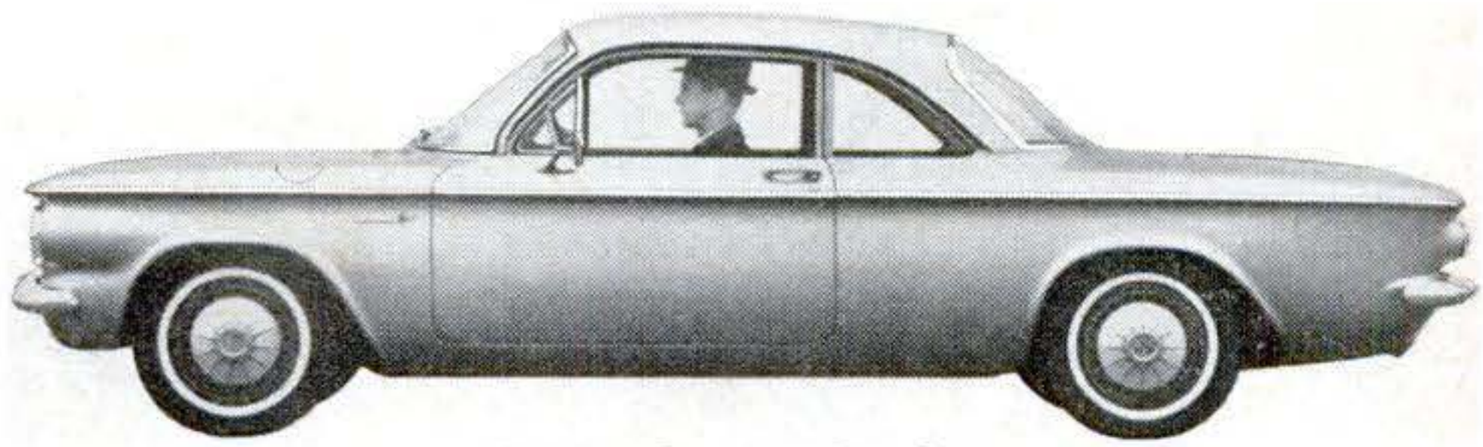

You know, one extremely pleasant thing about Corvair is its versatility. For instance, take transmissions. You can, of course, choose the standard three-speed box or Corvair Powerglide*.

But the big news (fanfare, please) is our new floor-mounted all synchro-mesh four-speed transmission*. Essentially, it's patterned after the design you'll find on many a Corvette—and the experts say that one's among the best in the business. For the technically minded, Corvair's four speeds line up like this: first, 3.65:1; second, 2.35:1; third, 1.44:1 and top 1.00:1. Nicely spaced, superbly supple.

Now, maybe you figure a four-speed gearbox gives you just another gear to shift. But then maybe you've never dropped your hand onto a palmful of pure driving sport. Frankly, though, it's next to impossible to sell you on an outfit like this in words. You've got to sell yourself—which you'll probably do, once you've had a taste of it. At your Chevrolet dealer's. . . . Chevrolet Division of General Motors, Detroit 2, Michigan. *Optional at extra cost.

corvair
*by Chevrolet*



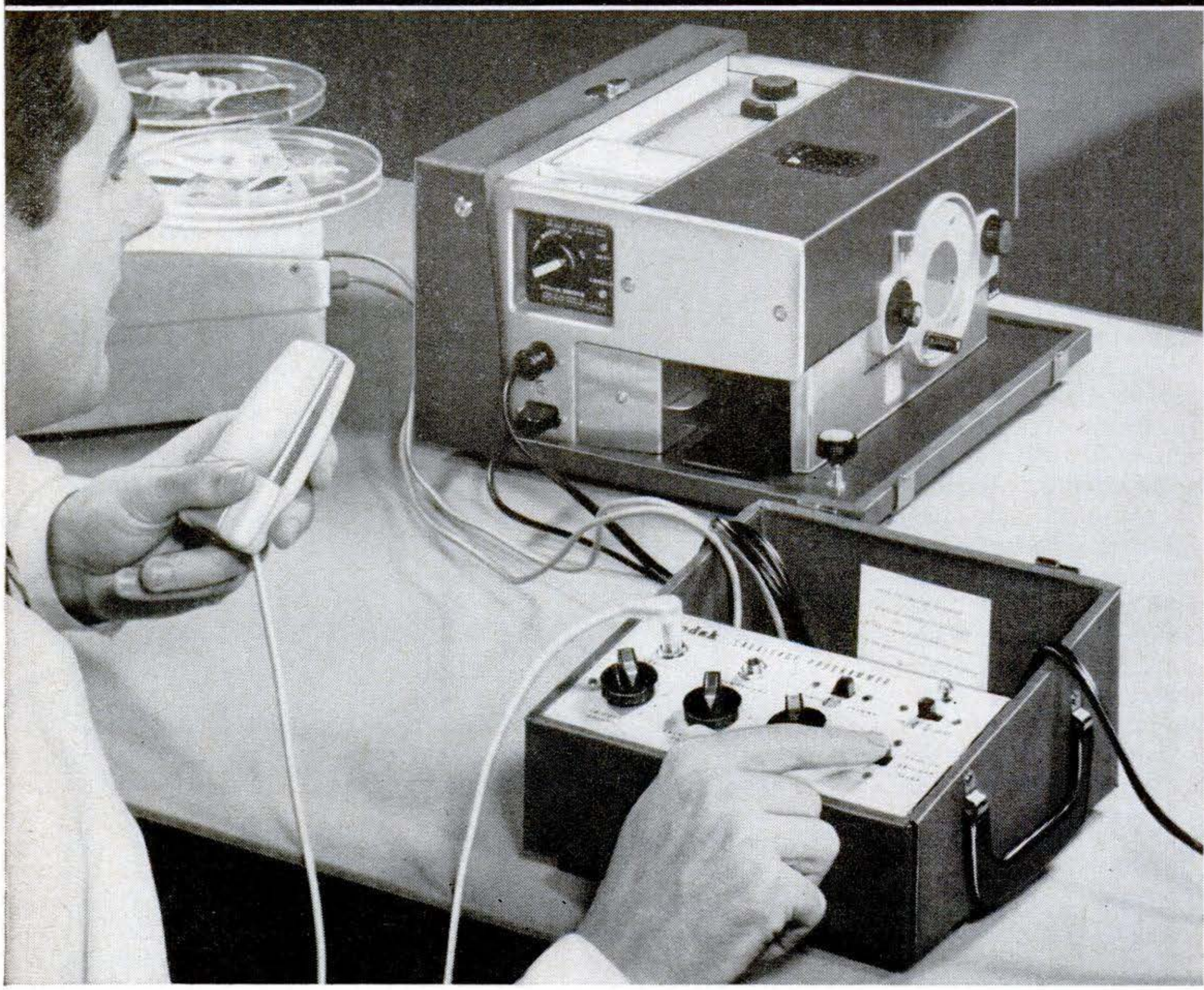



The lively Corvair 700 Club Coupe

Corvair, you know, is still the most advanced car in the land—and we've had a solid year to refine those engineering marvels: independent suspension all round . . . air-cooled aluminum engine in the rear and all the rest. Check into it—and while you're at your dealer's, get a load of that Greenbrier Sports Wagon!

Copyrighted material

# New Ideas in Photography



## How to make a slide show—with synchronized sound!

### New Kodak Programmer lets you add voices, music, sound effects to any series of slides

An ingenious new unit by Kodak brings synchronized sound to slide presentations. The Kodak Cavalcade Programmer, Model 1, enables you to add taped music, comments or sound effects to go with any set of slides at do-it-yourself cost.

### How it Works

You simply connect the Programmer to a tape recorder and any Kodak Cavalcade Projector. Speak into the microphone. After your narration for each slide, press a button on the Programmer. This puts a "tripper signal" on the tape.

In playback, the same hookup is used. Your taped narration comes through just as you recorded it, and the taped signals cause each slide to change at the correct moment.

### Continuous Showings Possible

With the special Kodak Cavalcade Repeating Projector, and a repeater-type tape recorder, continuous shows can be programmed. The show will repeat until you turn the equipment off.

Price of the Kodak Cavalcade Programmer is less than $96. Kodak Cavalcade Projectors are priced from less than $110. See your Kodak dealer for exact retail prices.



Copyrighted material

# from Kodak

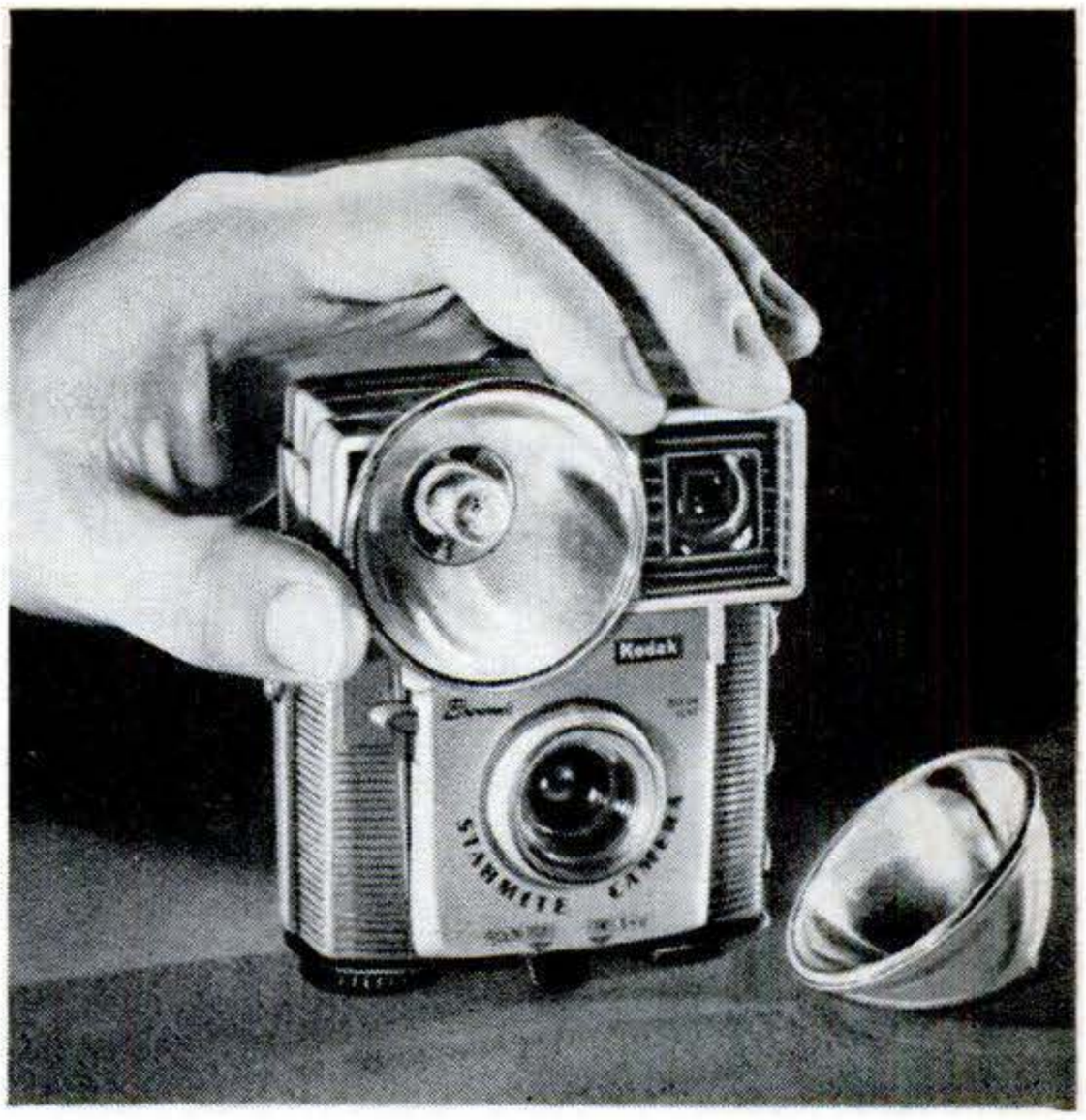
## Vacuum Coating Helps Tiny Reflectors Put More Light on the Subject

A tissue-thin layer of aluminum—*only two molecules thick*—gives the small, built-in reflector on this Brownie Starmite Camera (see photo at right) its bright, mirror-like finish.

Vaporized aluminum is deposited on the reflectors as they turn on racks inside big vacuum ovens.

The result: reflectors for Brownie Starmite and Starflash Cameras provide more reflected light than many units twice their size. An invisible lacquer coating prevents fingerprints from injuring the sparkling mirror-bright surface.

These pint-size reflectors from Kodak pay off in smaller cameras and clearer pictures for you.




**Only 2 inches in diameter,** the reflector on this Brownie Starmite Camera has a Lumiclad "mirror finish" that enables it to reflect and direct more light than some units twice as large.

**Zoom lens** on Kodak Cavalcade slide projector.

**Kodak Cine Showtime** movie projector also has zoom lens.

## New Zoom Projection "Shrinks" or "Stretches" Your Living Room

Zoom projection is here—and it can "shorten" or "stretch" your living room when you're showing slides or movies. Just set up your projector at the most convenient point—for a few guests or a large party. Then slide the lens back or forward, to make image exactly fill your screen.

Zoom lenses can also be used to "zoom up" picture areas of special interest when showing slides. These lenses can be purchased separately —or as standard equipment on new Kodak Cavalcade and Showtime Projectors.

*Prices are subject to change without notice.*

***Picture it now — enjoy it again and again***

**EASTMAN KODAK COMPANY,** Rochester 4, N.Y.

Kodak
TRADEMARK

See Kodak's "The Ed Sullivan Show" and "The Adventures of Ozzie and Harriet"



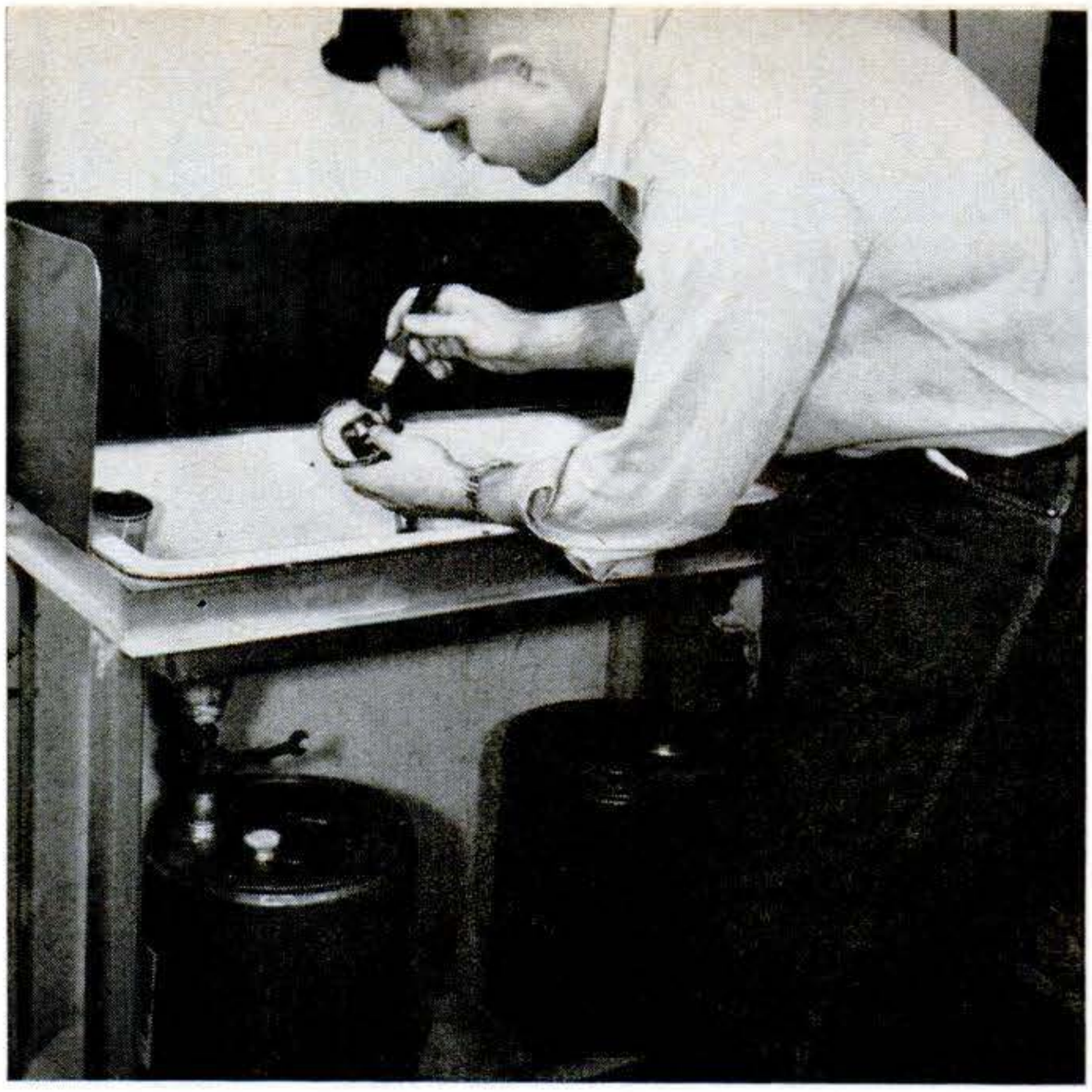
Copyrighted material

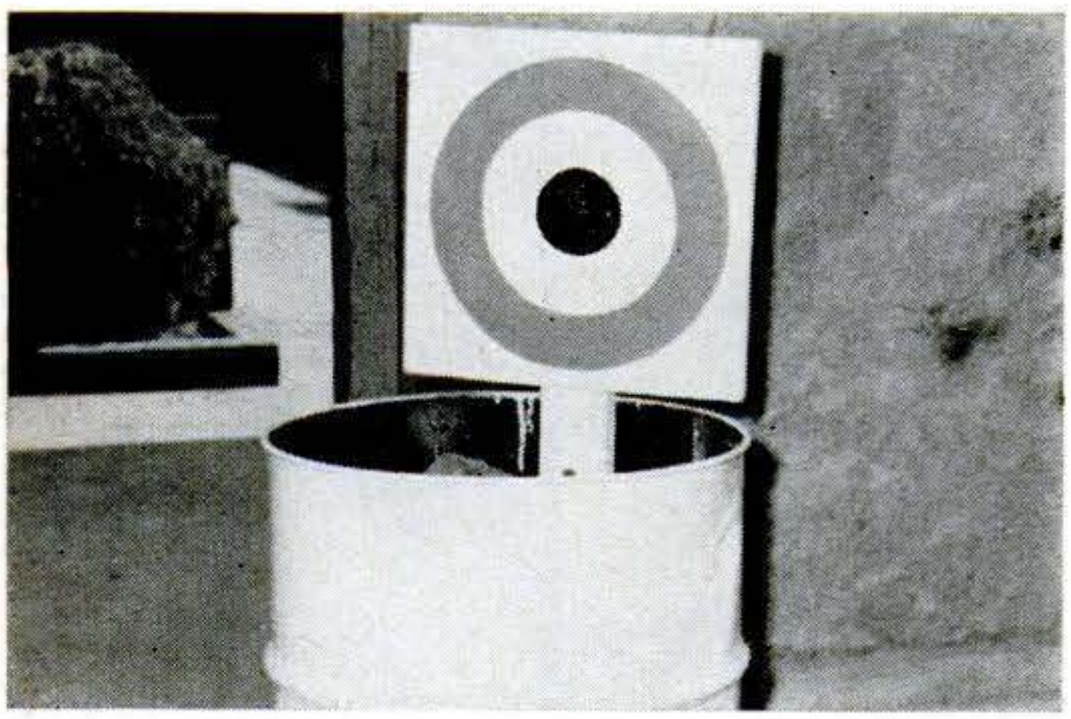
# Short Cuts and Tips

FROM PS READERS

## Clean-Up Basin from Salvaged Sink

SOLVENT for cleaning shop parts should be handled with care. You can make a safe drain-off basin from a discarded sink by suspending it in a wood or metal frame built to fit its flange. A drain cock on a short section of pipe lets you fill and empty the sink; drums placed underneath catch solvent for re-use. An attached screen keeps spatter off the walls.—*Phil McCafferty, Cedar Rapids, Ia.*





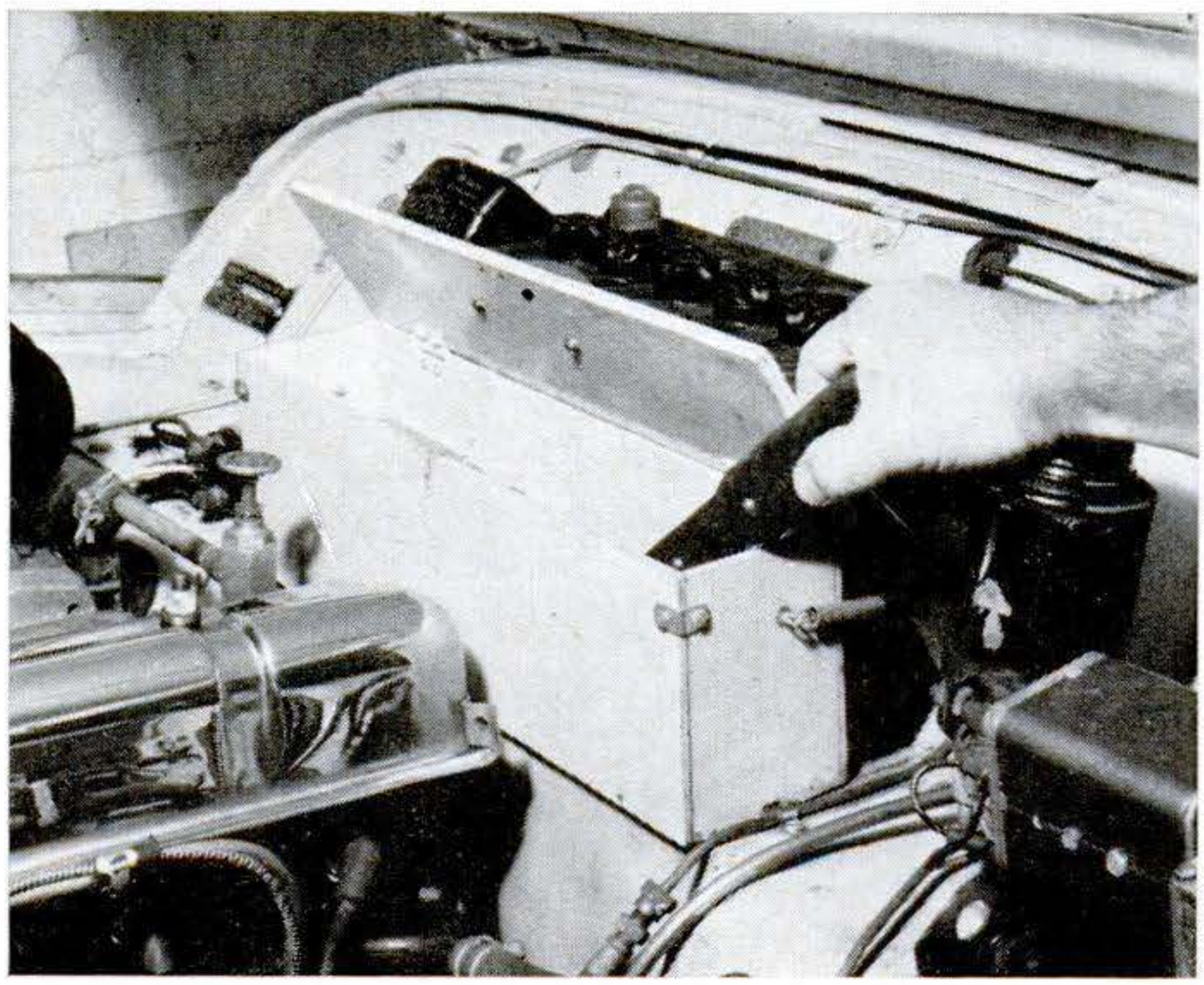
## Target Improves Trash-Can Aim

IRKED by the litter students left around a trash can, the principal of a California elementary school added this target to encourage more accurate aim. It works. —*Hi Sibley, Nuevo, Calif.*

▶▶▶NO STAPLING gun available for an emergency heavy-duty repair? A light stapler may do the job if you tap it sharply with a small rubber mallet instead of your hand.—*T. A. Flynn, NYC.*

## Auto Tool Chest Stored Under Hood

THE logical place for automobile tools is where they're used most—up front in the engine compartment. A box of plywood or hardboard, sized to fit an open area, need only be large enough to hold a couple of wrenches, pliers, screwdrivers, spare fuses and plugs, stuffed down with a wiping rag. Some engines wobble at idling speed, so allow clearance if you plan to mount the box close to the block.—*Robert Hertzberg, Douglaston, N. Y.*



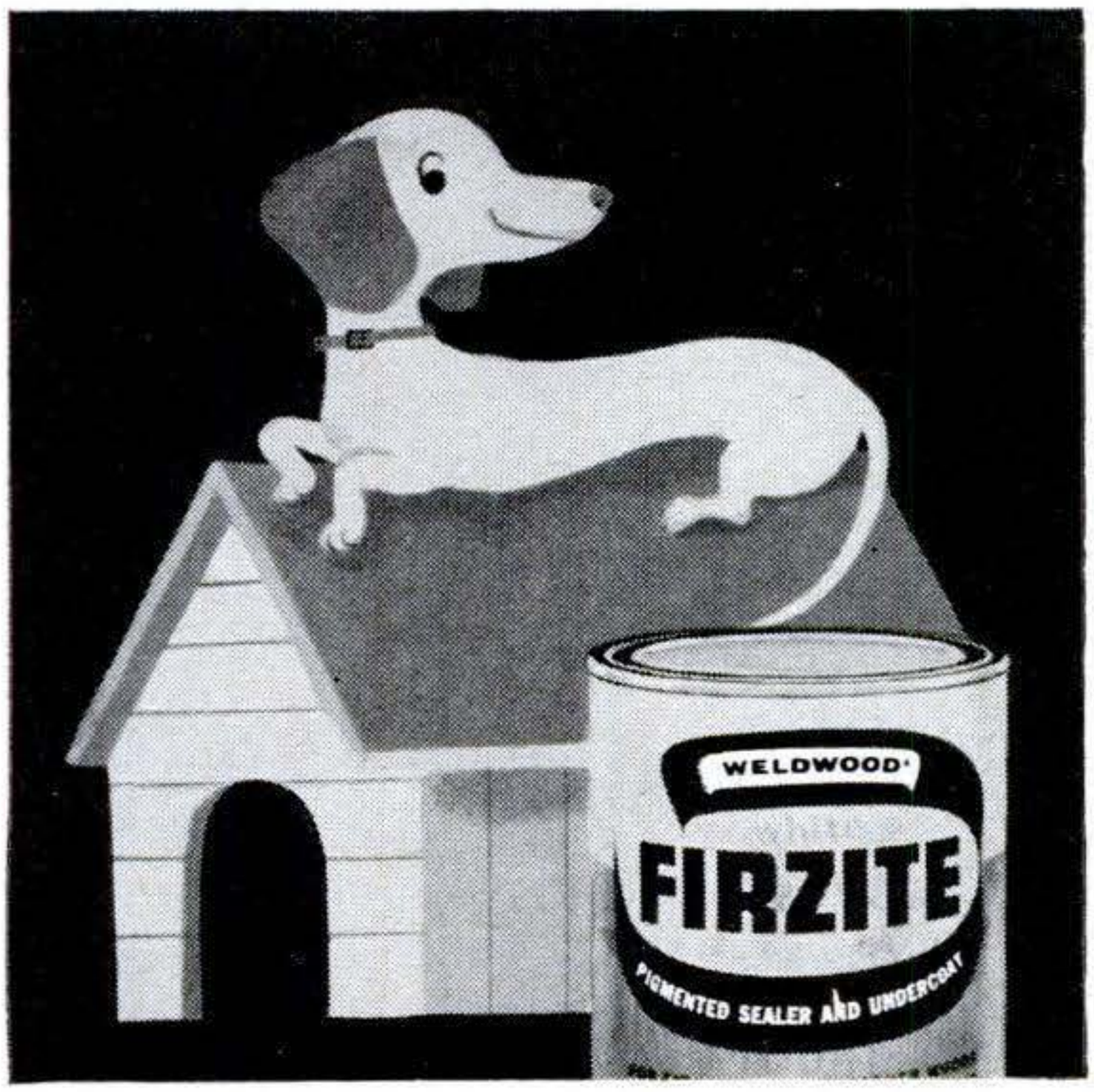


Copyrighted material

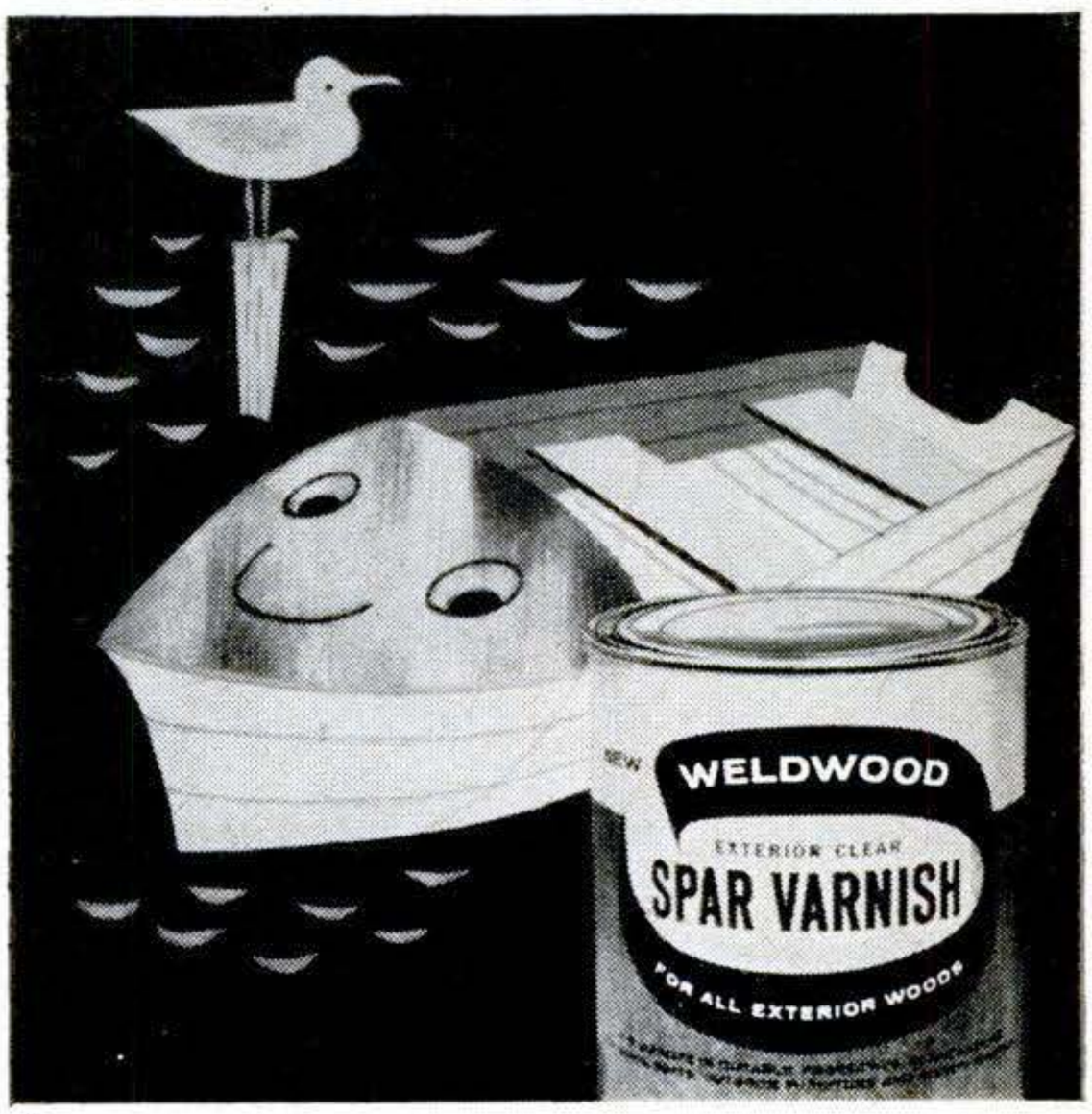
# Tips from Weldwood—the people who know what's good for wood

**Kill termites, prevent rot with WELDWOOD WOOD PRESERVATIVE . . .**

**Add lasting color to outdoor wood with WELDWOOD EXTERIOR STAINS . . .**




**Seal and prime outdoor wood with WELDWOOD FIRZITE . . .**




**Protect and beautify outdoor wood with WELDWOOD SPAR VARNISH . . .**

**WELDWOOD® WOOD PRESERVATIVE,** essential where wood is in contact with earth, contains full 5% pentachlorophenol.

**WELDWOOD EXTERIOR STAINS,** 4 beautiful "woodsy" colors: Redwood, Driftwood, Cascade Green, Sierra Brown.

**WELDWOOD FIRZITE®,** a penetrating resin-sealer for fir plywood, pine, etc. Comes in *Clear* to prevent "wild grain" in stain jobs; and in *White*, a pigmented prime coat to combat checking in paint jobs.

**WELDWOOD SPAR VARNISH,** durable, high gloss exterior clear finish that resists discoloring even in severe weather.

**WELDWOOD**

WOOD FINISHES

*Products of United States Plywood*



Copyrighted material

The Beechcraft Super 18, one of the most reliable and popular planes ever built

# Spark your car with Champions— the plugs that power more aircraft the world over!

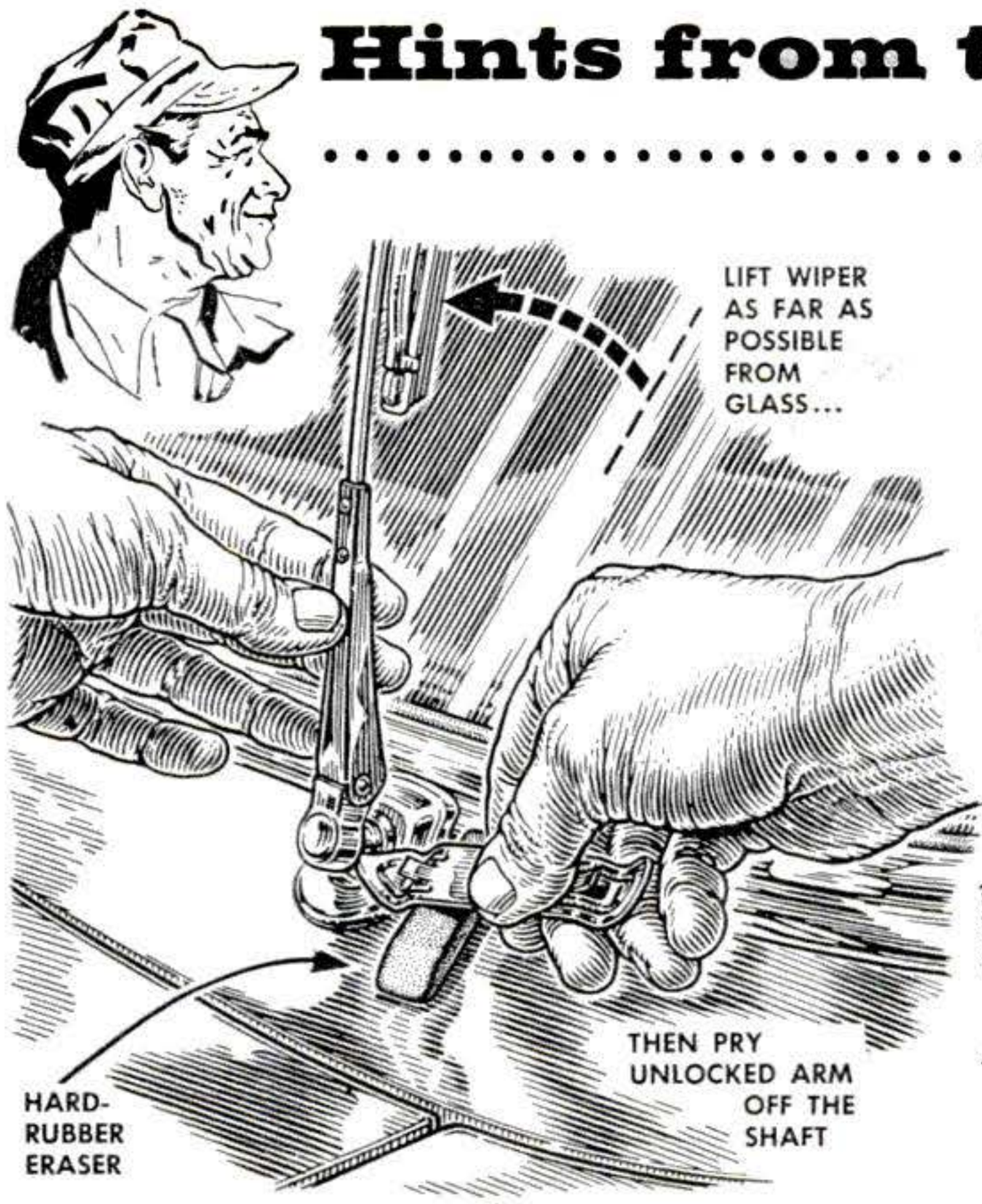
*Twice* as many car makers specify Champions for dependability. Above: Rambler American.

Airplanes can't risk misfiring spark plugs on take-off—or in the air. That's why dependable Champions are an overwhelming first choice with airlines and pilots. And *you* can't afford misfiring plugs when passing in today's parkway traffic. Put a new set of Champions in your car every 10,000 miles. They'll deliver greater dependability, safer passing power . . . and save money on gasoline!

**CHAMPION**

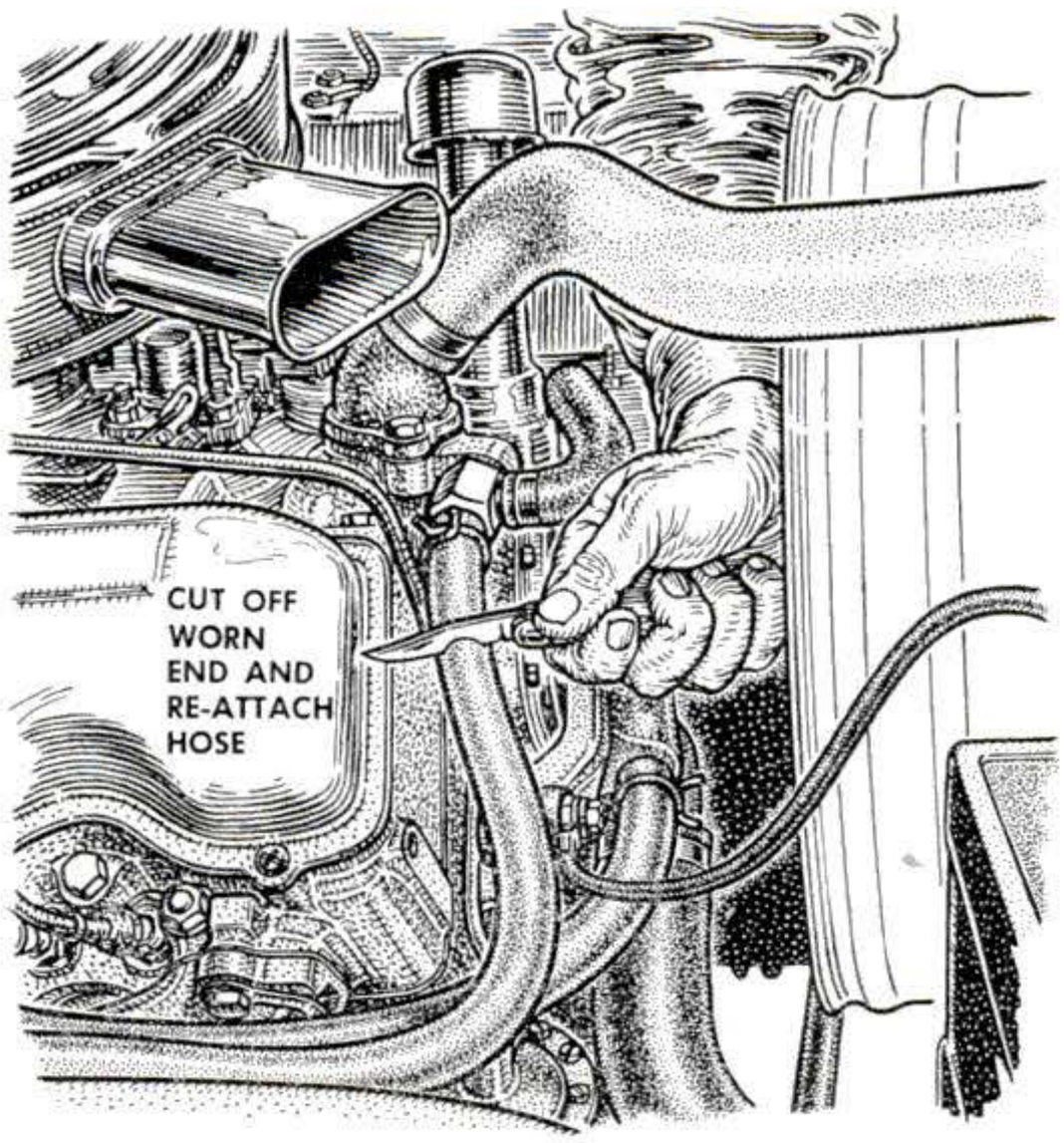
Copyrighted material

# Hints from the Model Garage

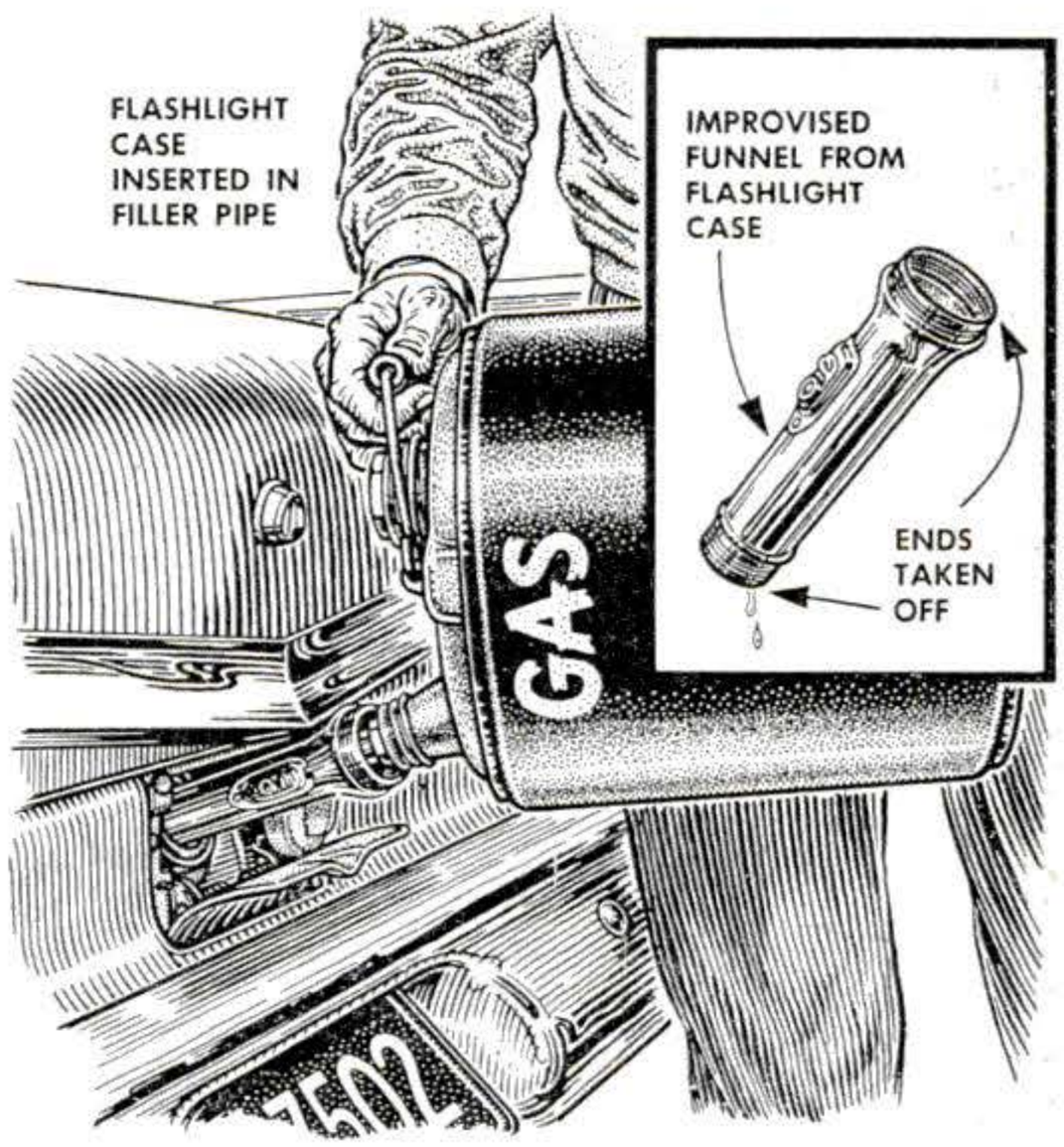



**Remove a stuck wiper arm** this way and you won't mar surrounding paint. Rest a beer-can opener on a hard-rubber eraser to give you a padded fulcrum and hook the point under the hub. The wiper arm can then be pried off easily.

**A dash-mounted handle** makes it easier for front-seat passengers to get in and out. Use a screen-door handle and fasten it with sheet-metal screws. It will also provide a steadying handhold for children who like to ride standing up.




**When installing a heater,** leave some slack in the hose line. When the hose deteriorates at the engine—as it usually does first—you can cut off the bad end and reconnect the hose without installing a new line or draining the coolant.




**An emergency funnel** for pouring gasoline from a can into a hard-to-reach filler pipe can be improvised from your car's flashlight. Remove both ends and the batteries, and insert the empty case into the filler pipe to extend it.

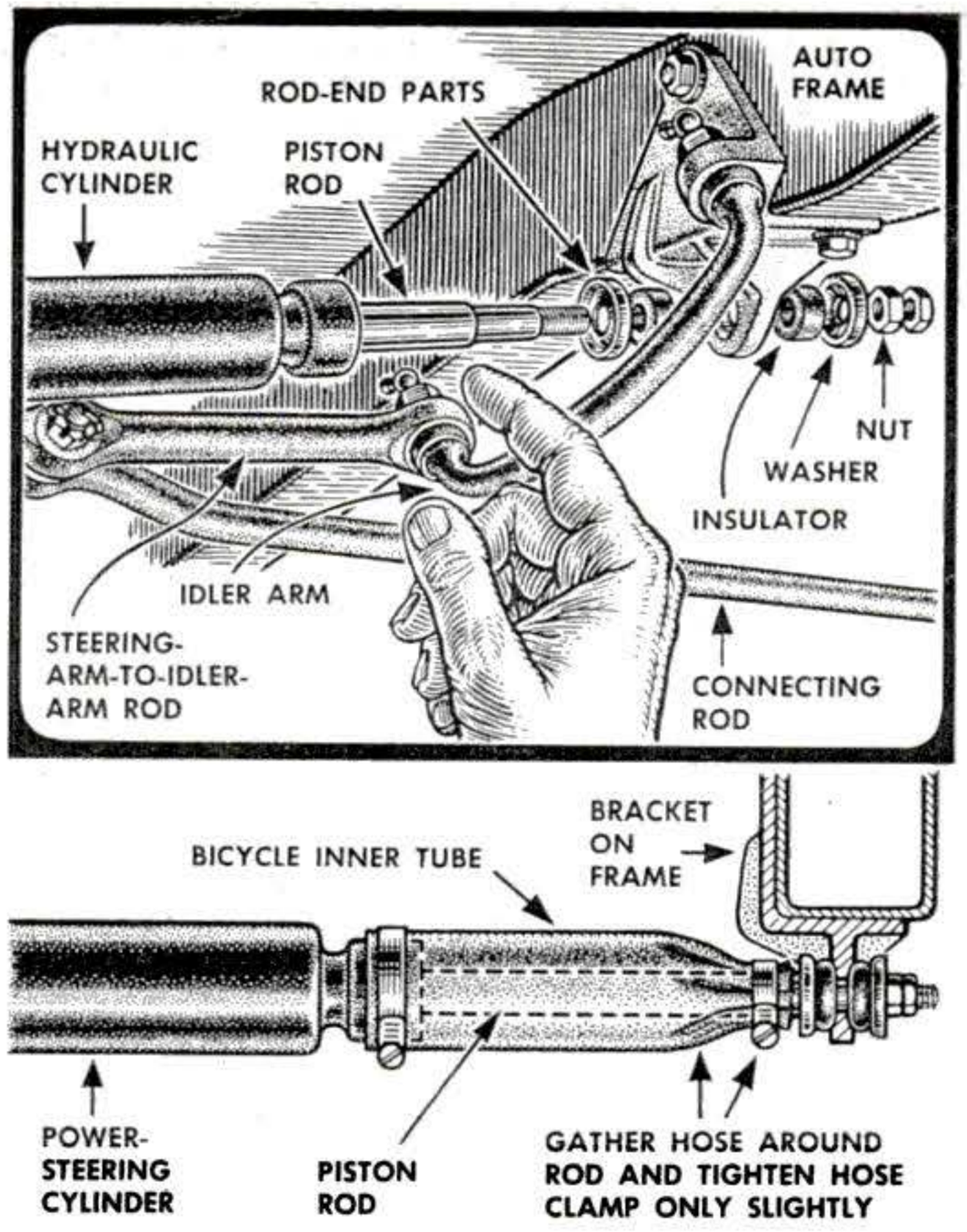
CONTINUED



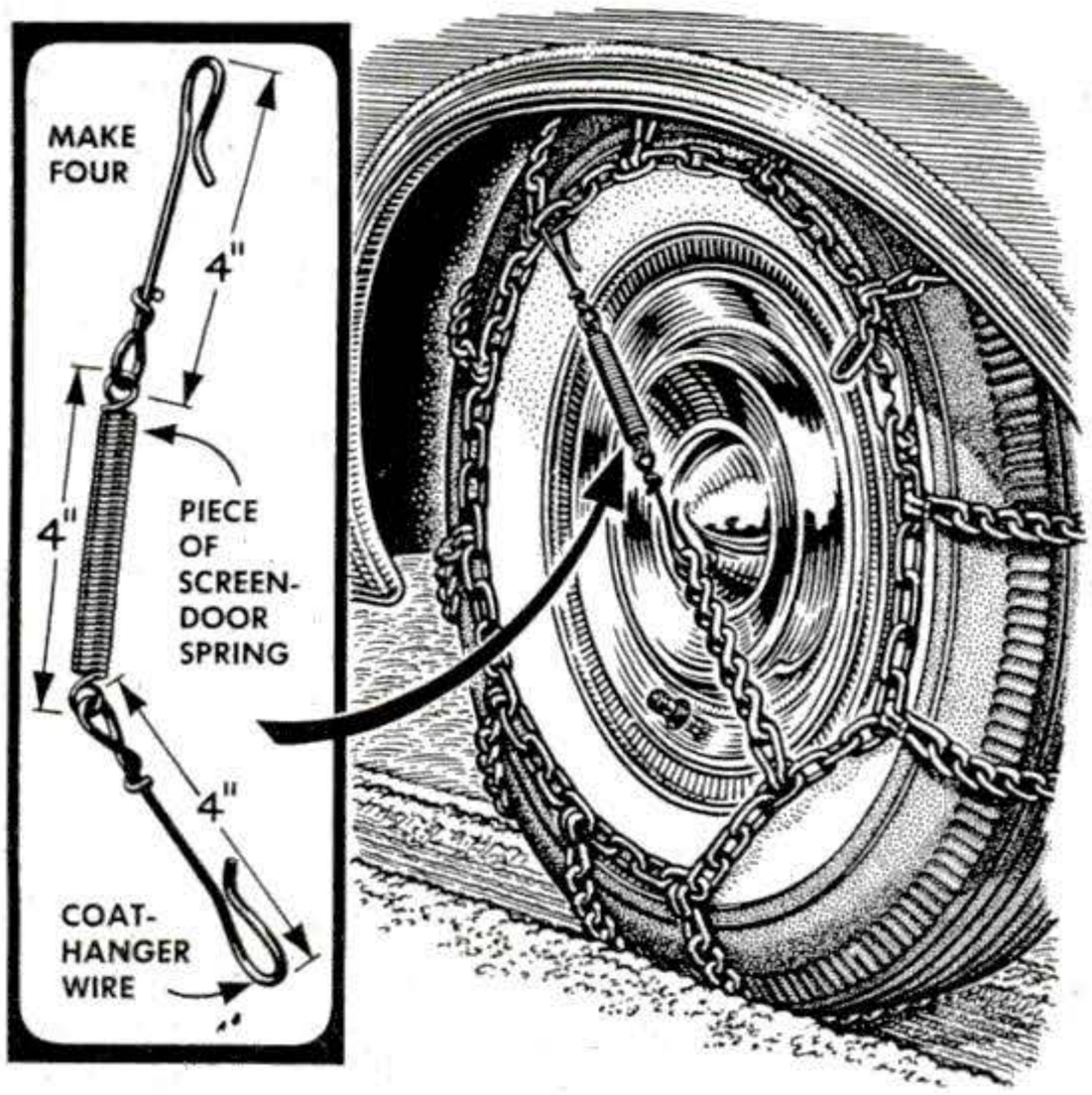
Copyrighted material

# More Hints from the Model Garage

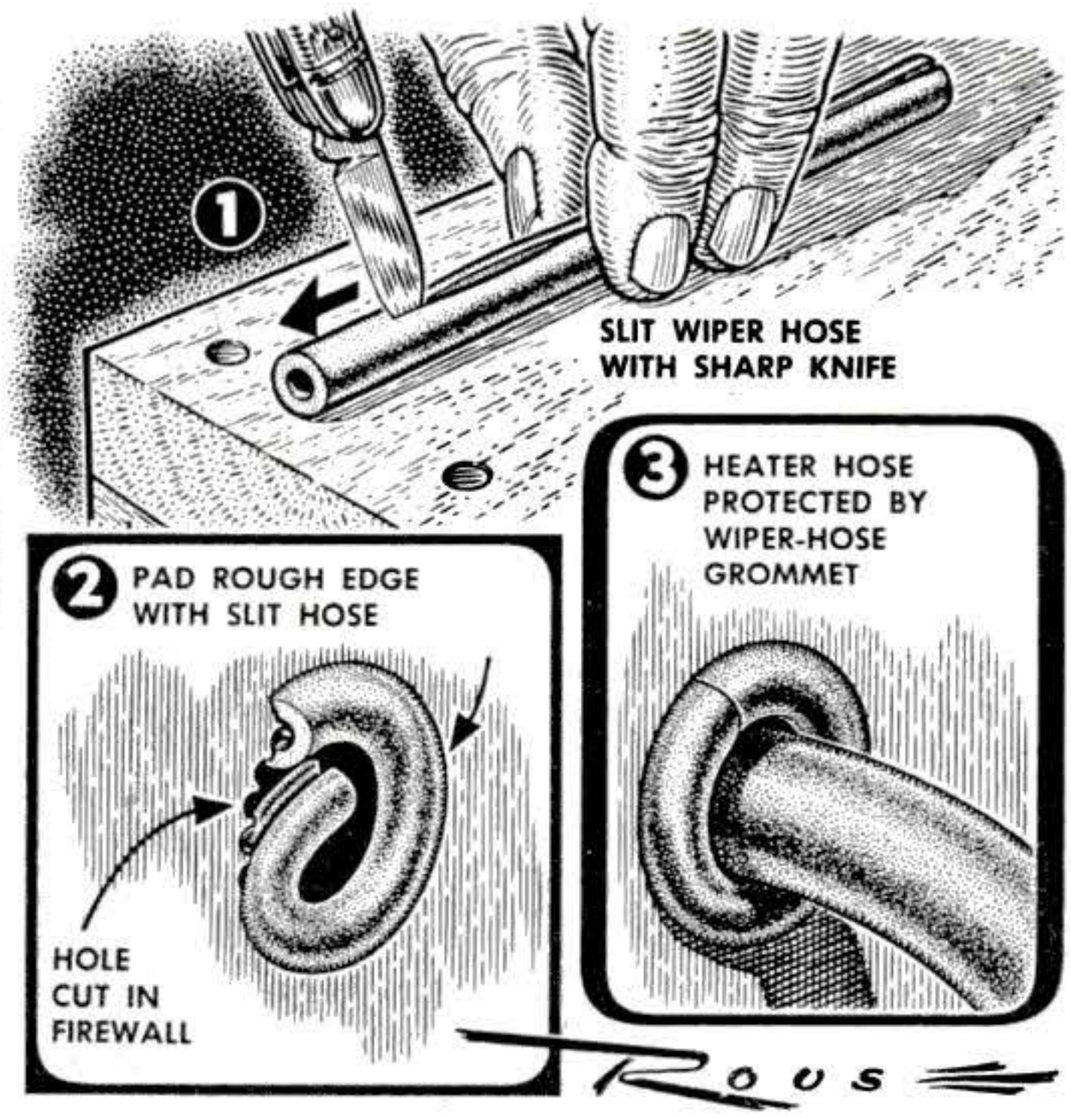
**You can hush rattles** in a spare-tire cover with this trick. Cut a slit around the inside diameter of an old bicycle inner tube and slip the tube over the rim of the cover. The cover will still fit its opening—but snugly and quietly.




**Exposed power-steering pistons,** found on some cars, pick up dirt and grit that ruin the hydraulic seal. You can stop this by covering the pistons with sleeves cut from a bicycle inner tube. Fasten the sleeves on with hose clamps.



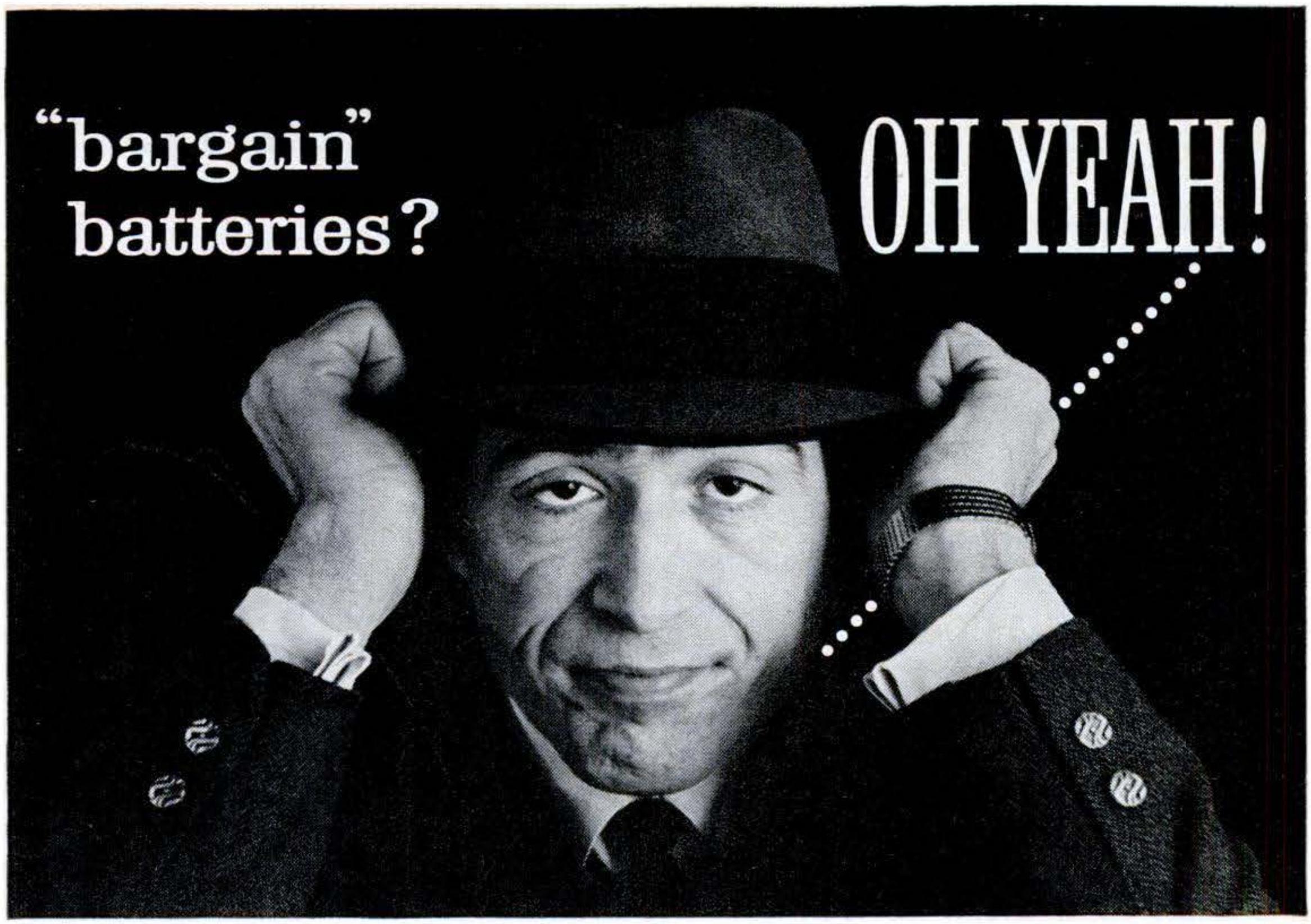

**Stop broken chains from clanking** by carrying along a few of these spring clips. Cut 4″ lengths from a screen-door spring and bend hooks from coat-hanger wire. They're faster to use than repair links and they hold the chains under tension.




**A heater hose won't fray** where it passes through the firewall if you make a grommet like this. Slit a length of rubber windshield-wiper hose down the middle and slip the hose over the rough edges of the drilled-out hole in the firewall.



Copyrighted material



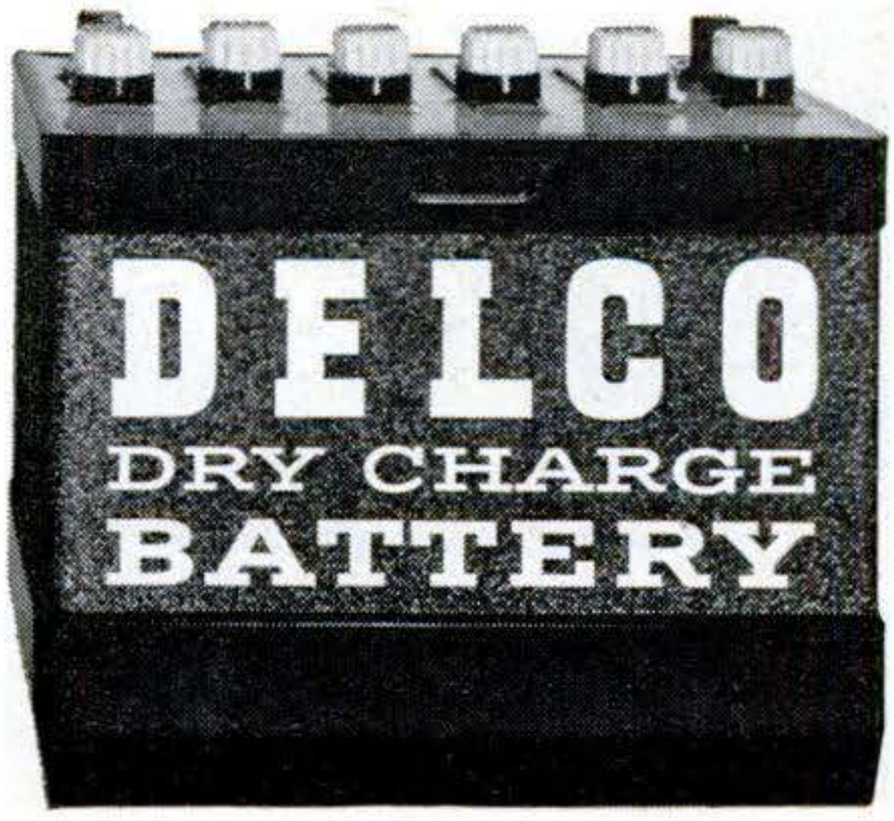

**Why try to get by with a "bargain" battery. Save time, money and trouble with a dependable Delco DC-12 Dry Charge!** You can figure this one out fast. What does it cost you to be late for work? A couple of hours missed because of a bad battery adds up to inconvenience . . . and money. You'll avoid such trouble with a sure-starting Delco Dry Charge Battery.

**ALL THE POWER YOU PAY FOR . . . DELCO!**
A Delco DC-12 stays bone dry . . . can't lose any "zing" on the shelf! When you buy it, the dealer adds the fluid that activates it with 100% fresh starting power . . . plus the reserve power required for modern automotive electrical equipment.

**YOUR BEST QUALITY BUY . . . DELCO DC-12!**
*Extra fluid capacity*—Less refilling, less danger of damage from low fluid level. *Hard rubber case*—Stronger, also resists heat distortion. *Microporous rubber separators*—More current flows between plates, means peak power at all temperatures. Ask your dealer about these and many other Delco quality features.

**A DEALER NEAR YOU . . . DELCO!**
He's a *local* businessman who appreciates your service business, wants to keep it. Automotive service is not just a sideline with him . . . it's his *specialty!* He knows your driving needs, can recommend the right Delco Battery for your car.

**BE SURE . . . REPLACE WITH DELCO!**
For dependable starting in any weather, replace with 100% fresh Delco. It's "Designers' Choice" for most new cars, survey-proved as "Drivers' Choice" for replacement, too. When it's time to replace your old battery, make sure you get a Delco DC-12! *DELCO ENTERTAINS YOU—"Stagecoach West" and "The Islanders"—ABC-TV.*




*DELCO . . . "A GOOD NAME FOR GOOD SERVICE!"*

*Another reliable General Motors product, distributed nationally through* GM U·M·S PARTS SALES UNITED MOTORS SYSTEM

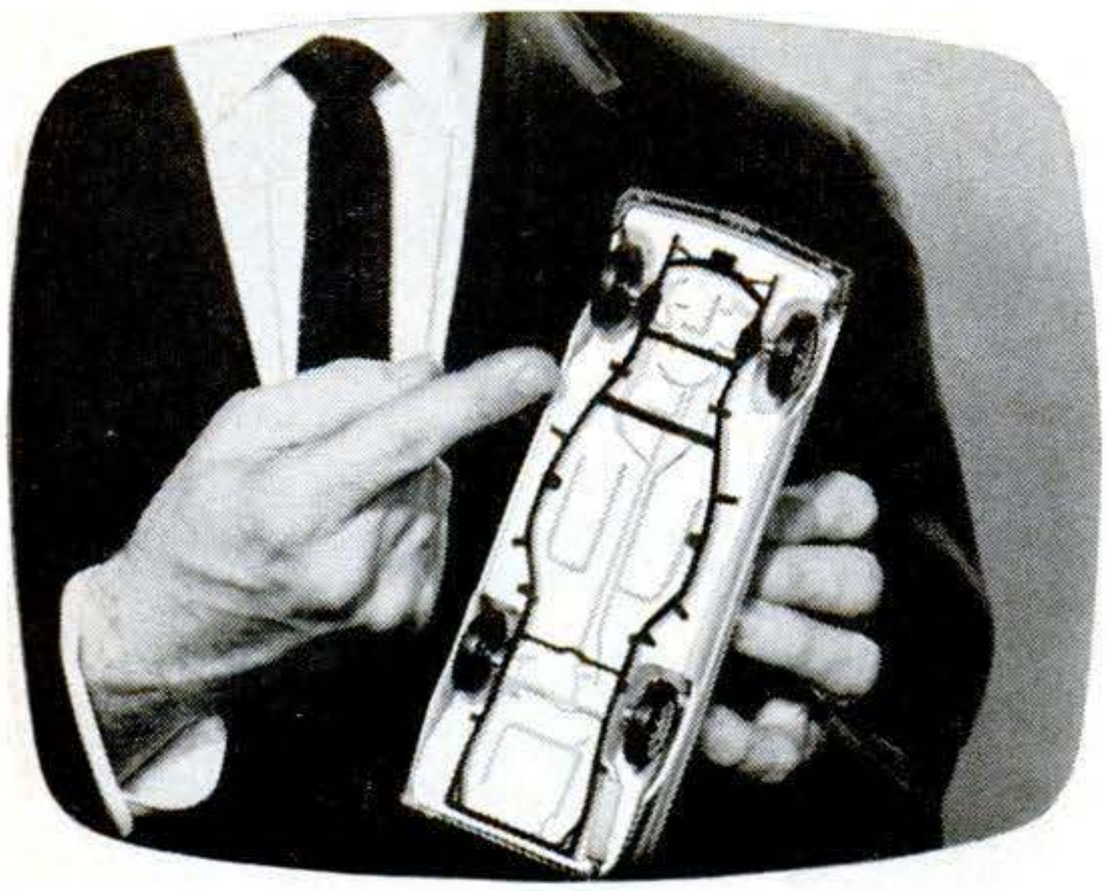


Copyrighted material

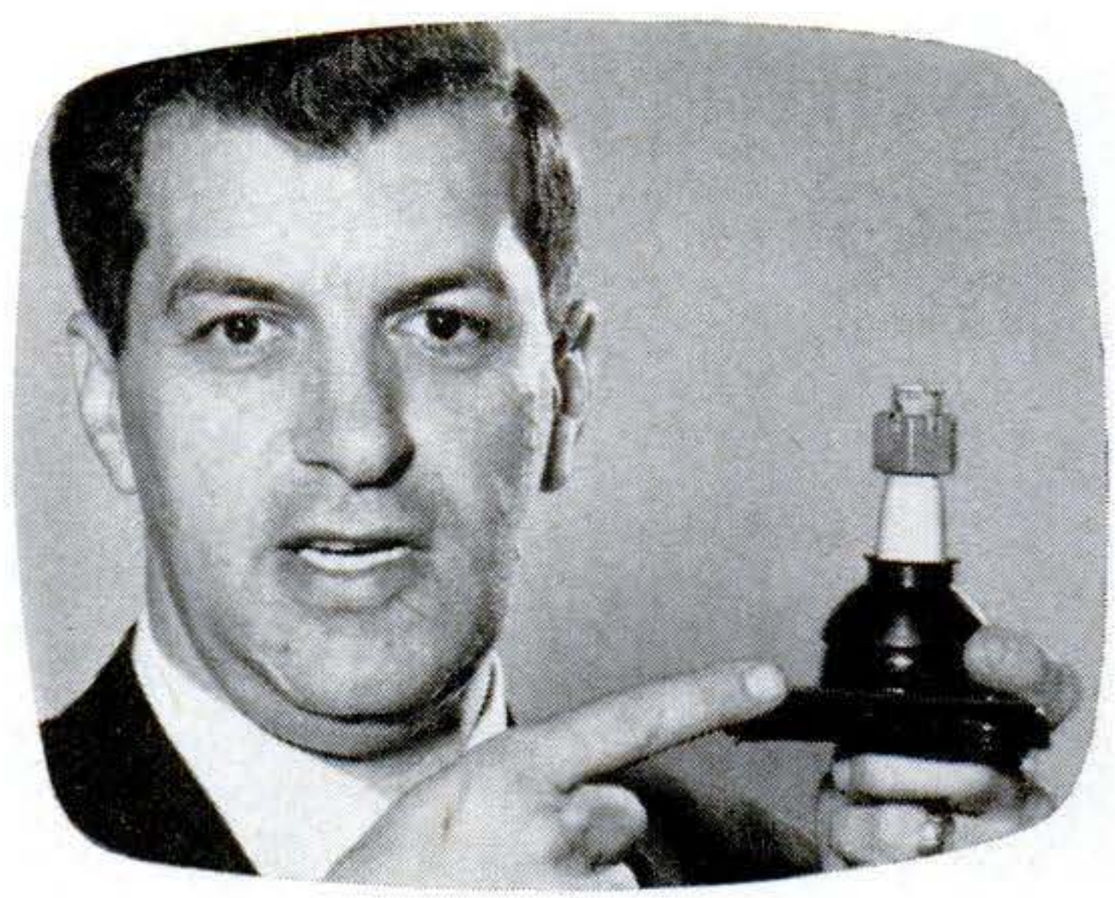
TV's Professor Jonathan Karas tells why

# The 1961 Ford

Professor Jonathan Karas, physicist at Lowell Technological Institute, uses an X-ray to demonstrate—as he does on Ford's TV shows—a remarkable feature of the '61 Ford.



"Other cars require a chassis lubrication every one to two thousand miles costing up to $45 in 30,000 miles. But Ford's famous ball-joint has a special sealed-in lubrication, very much like the human shoulder joint."

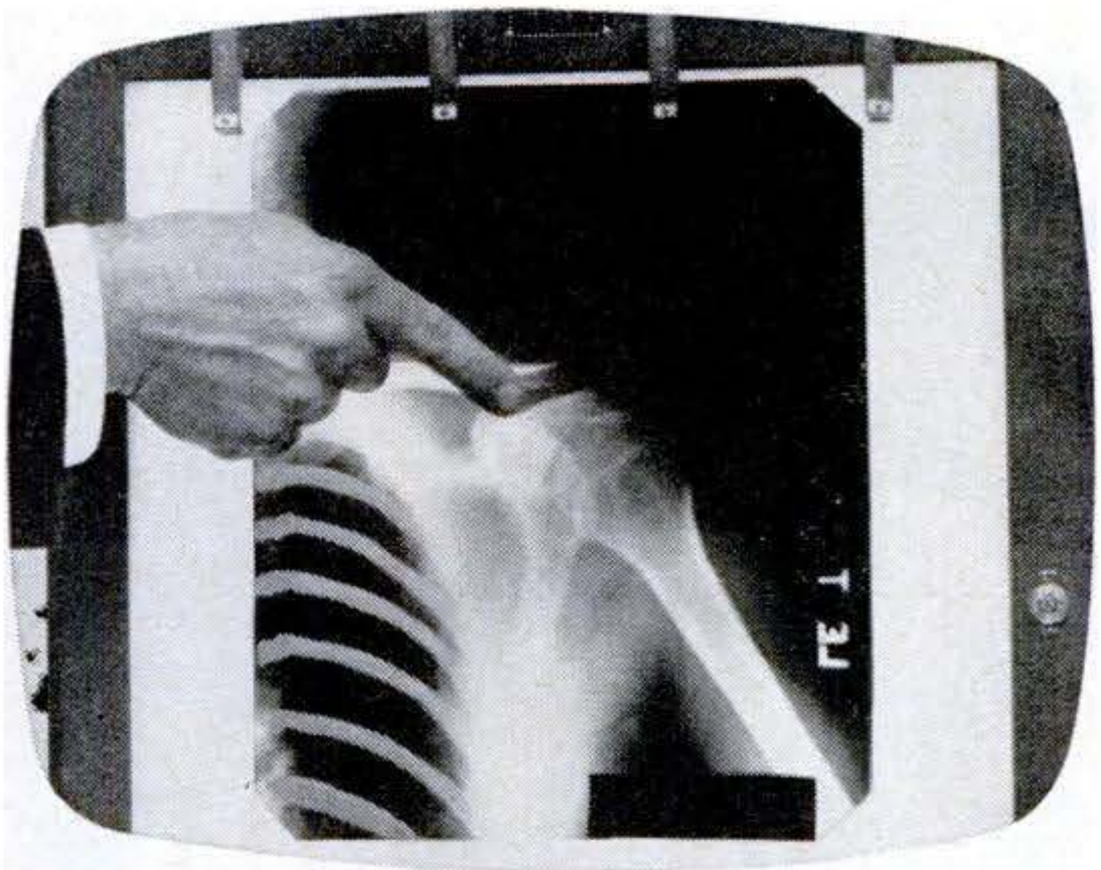


"Here it is, the crucial part of Ford's suspension. This unit is a ball-joint, protected by molybdenum disulfide grease, a new lubricant that Ford helped develop. It forms a molecular bond with the metal."

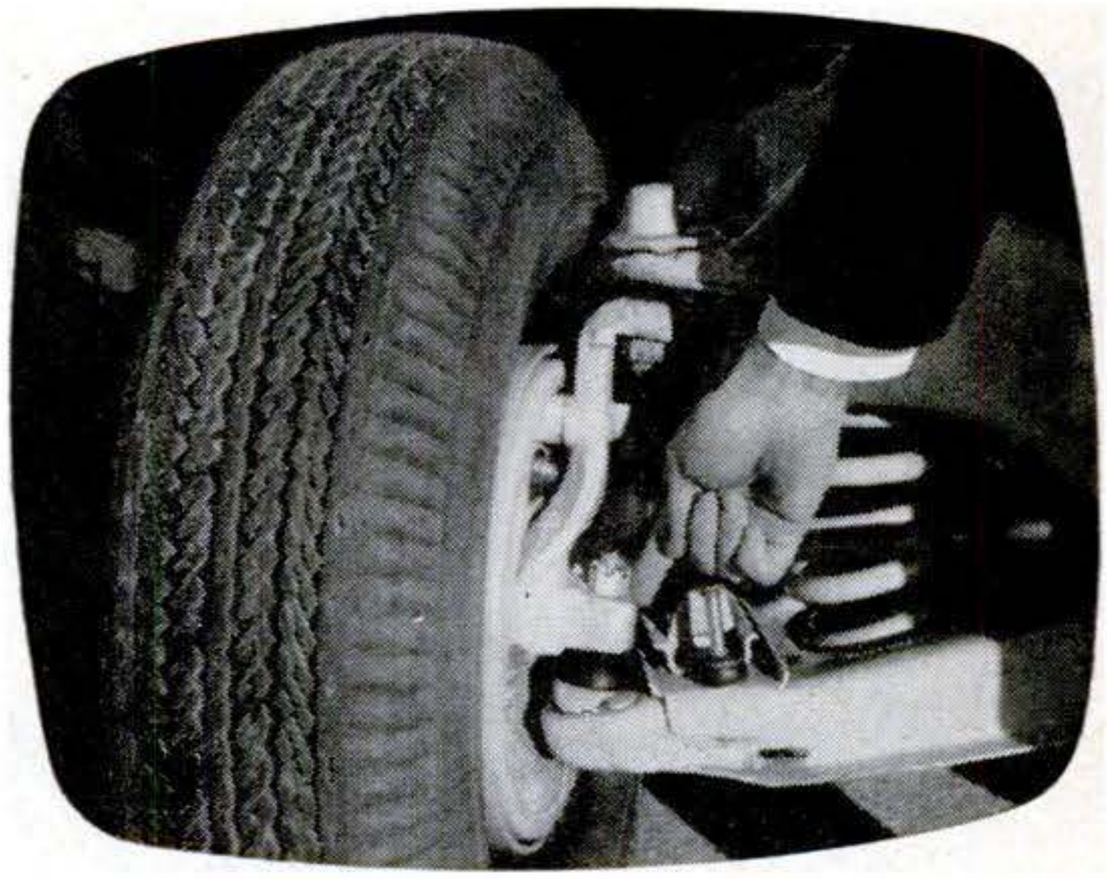


Copyrighted material

# is built to go 30,000 miles between chassis lubrications



"This is a human shoulder joint. The reason it works so well and so dependably is that nature provides what is, in effect, a sealed-in lifetime lubrication."



"And this is a photograph of a ball-joint on the '61 Ford. Let me show you how Ford engineers took a tip from nature to give you more carefree driving."

"And this polyurethane ring, another Ford development, seals in the grease so well that Ford can go 30,000 miles between chassis lubrications. And these cost only about $4—take about 20 minutes."

"Sealed-in lubrication is just one feature that makes the '61 Ford *beautifully built to take care of itself.* Two others are: self-adjusting brakes, and Full-Flow oil filtration . . . you change oil only every 4,000 miles."

FORD DIVISION, *Ford Motor Company*



Copyrighted material

# Gus Meets with Resistance

**By Martin Bunn**

Copyrighted material

*"Now look, Mr. Wilson," Calladay said. "We don't want any trouble. You ever hear of voltage drop?"*

"GUS WILSON?" asked the short, sunburned man who walked into the Model Garage.

"You've found him," said Gus.

The man unbuttoned his topcoat and whipped out a card.

"Nat Calladay, service manager of Plymouth Pumps."

"Oh, sure," said Gus. "You're here about that defective compressor."

"I'm here to investigate your complaint," said Calladay quickly.

The implication that it was unjustified made Gus bridle a bit. "I bought that new compressor from Ed Swain. Thought he'd come around about it."

"Swain's been transferred to a warmer climate for his health."

"I see," said Gus, recalling Swain's struggle with arthritis. "Well, this machine keeps opening the circuit breaker."

He led the way to one side of the shop, and a shiny new compressor.

"Only way we can get air now is to hold in the breaker. Listen to it."

He threw up the switch handle. The big motor groaned into action, but died as a loud snap sounded across the shop.

"There goes the breaker," said Gus. "That motor's badly overloaded. Could be a tight bearing or a broken ring."

"Or could be," replied Calladay, "old-fashioned, inadequate wiring."

Gus shook his head. "Swain checked it, said it was okay for this model."

"Maybe he was a bit old-fashioned himself," suggested Calladay. "I'll send you a good electrician."

CONTINUED



Copyrighted material

"Don't need one," said Gus flatly. "Either send your mechanics to check this machine or get it out of here."

"Now look, Mr. Wilson, we don't want any trouble. You ever hear of voltage drop?"

"Seems to me I have," said Gus.

"Well, now, this rig is about 60 feet from your service panel. You've got 120 volts there, but you deduct 60 and what've you got left?"

"Sixty?" asked Gus innocently.

"Sure. And what does the nameplate on that machine say? A hundred twenty. How d'you expect to run it on 60?"

Amused by this distortion of logic, Gus said nothing.

"So what's to be done?" went on Calladay glibly. "You get heavier wiring installed, and I'll guarantee . . ."

"Your company's guarantee is what I count on," said Gus. "If you won't back it up, I'll go to them."

"I'll have to report your wiring's at fault. No hard feelings, I hope."

A LATE chill fell with dusk. Stan Hicks, Gus's assistant, had locked the pumps and shut the shop, but Gus remained for some paperwork. He was surprised by a hammering on the shop door. It was Calladay.

"Say, am I glad you're in! Seems every other garage in this hick town is buttoned up for the night."

"We're closed, too."

"My car's stuck in the municipal parking lot. The battery won't turn the engine."

"Plenty of service stations open."

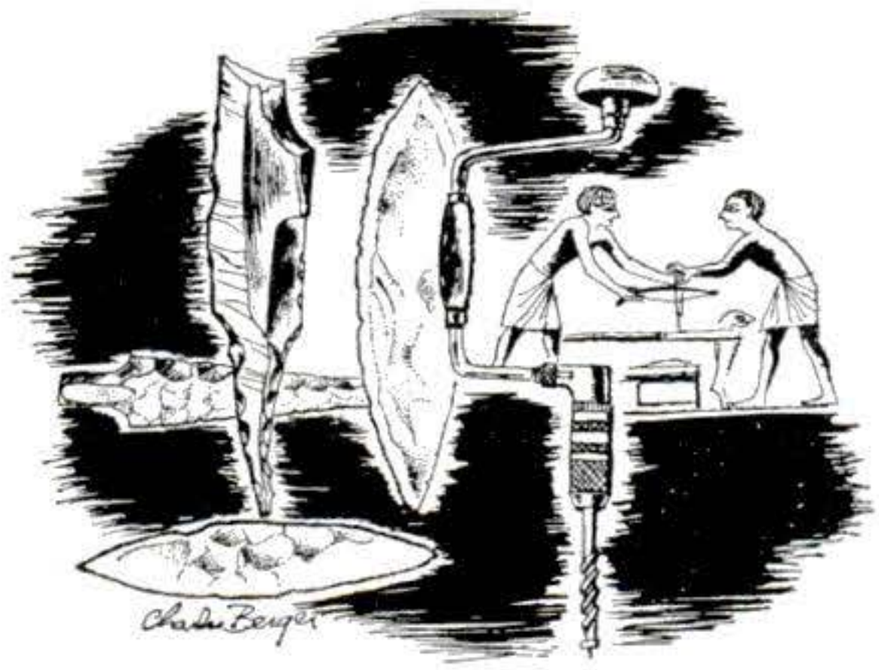
"Yeah, but they say they have nobody to send out. Fact is, I had some arguments around here."

"Don't think I can help," said Gus. "This cold snap's kept our charger so tied up on customers' cars that both our booster batteries are down."

"Couldn't you give me a push start? That lot closes at midnight. And if I don't get my car out tonight, the cops will give me a ticket."

A flicker of sympathy stirred in Gus. "Guess I've worked late enough. Wait a minute and we'll drive over."

**Where'd it come from?**



DRILL: Stone Age man could make a hole in soft wood or leather with flint points. Copper cultures used metal awls and points. The bow drill came into use toward the end of the third millennium B.C. (Rotary action was produced by looping a slack bow string around the drill and then drawing the bow back and forth.) The prototype of today's cutting-edged tool had to await the Iron Age to be perfected. Among the tools found at Thebes in Upper Egypt is a drill designed in modern style so that both edges cut forward when rotated.

BITTER cold assailed Gus as they left the garage. The city parking lot was almost empty. Under its stark floodlights stood a modest seven-year-old sedan.

Gus checked the battery terminals first. Both were tight. But the starter gave up the instant its pinion meshed.

"Let it roll back. I'll push with my truck."

The sedan slid back out of the slightly upgrade parking lot. Gus shoved it less than a hundred feet before the engine caught. Calladay scrambled out.

"How about leaving it in your shop?" the little man asked. "And could you install a new starter tomorrow?"

"Are you sure you need one?"

"I'm sure now. Besides, it won't start if I leave it out all night."

"Okay," agreed Gus. "Follow me."

IT WAS midday when Calladay reappeared.

"On thinking it over," he told Gus, "I guess we better tear down that compressor. Our mechanics are on the way."

"Fine," returned Gus. "I've been boosting your battery. What makes you think your starter's bad?"

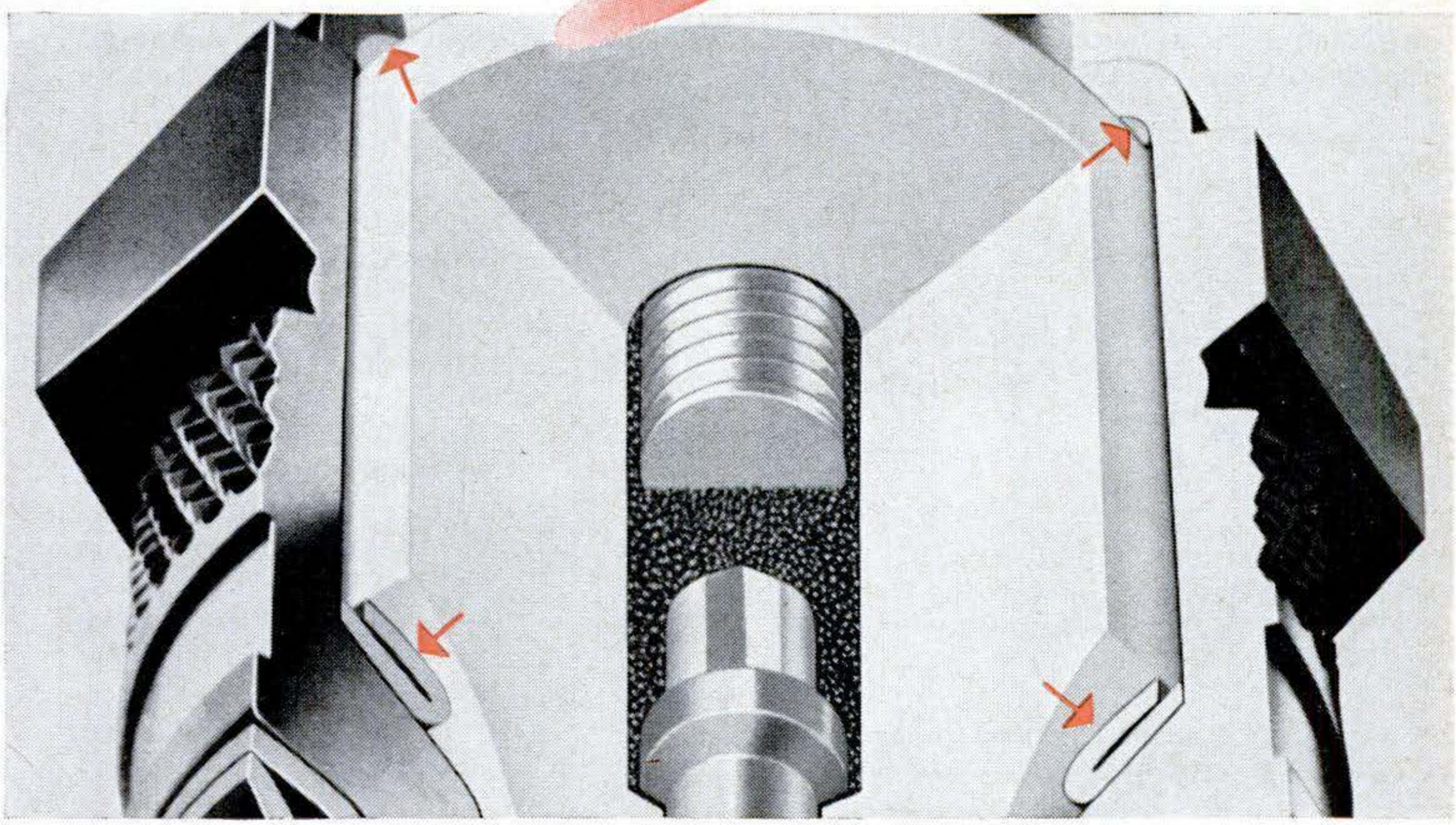
"It began on my way up from Florida," said Calladay. "Fellow in North Carolina



CONTINUED

Copyrighted material

# AC's superior sealing qualities



## positively protect against combustion gas leakage and engine-damaging pre-ignition

With AC Spark Plugs you get superior gas sealing features that assure longer peak spark plug performance, maximum engine efficiency and economy.

First of all, there is AC's exclusive copper-glass conducting seal that fuses the terminal screw and center electrode to the insulator in a gas-tight bond. Then there is AC's famous shell shrinking process that tightly compresses gaskets placed between the upper and lower shoulders of the insulator to prevent gas leakage between insulator and shell.

Combustion gas leakage causes spark plugs to overheat, resulting in rapid electrode wear, engine-damaging pre-ignition and eventual spark plug destruction. AC Fire-Ring Spark Plugs give you full protection against these dangers—do a better job than ordinary spark plugs using cements or compacted powder seals. Next time your car needs a spark plug change, get top performance and smooth, long-lasting power by getting a new set of ACs.

AC SPARK PLUG THE ELECTRONICS DIVISION OF GENERAL MOTORS

AC Fire-Ring spark plugs

*They must be the best!*



Copyrighted material

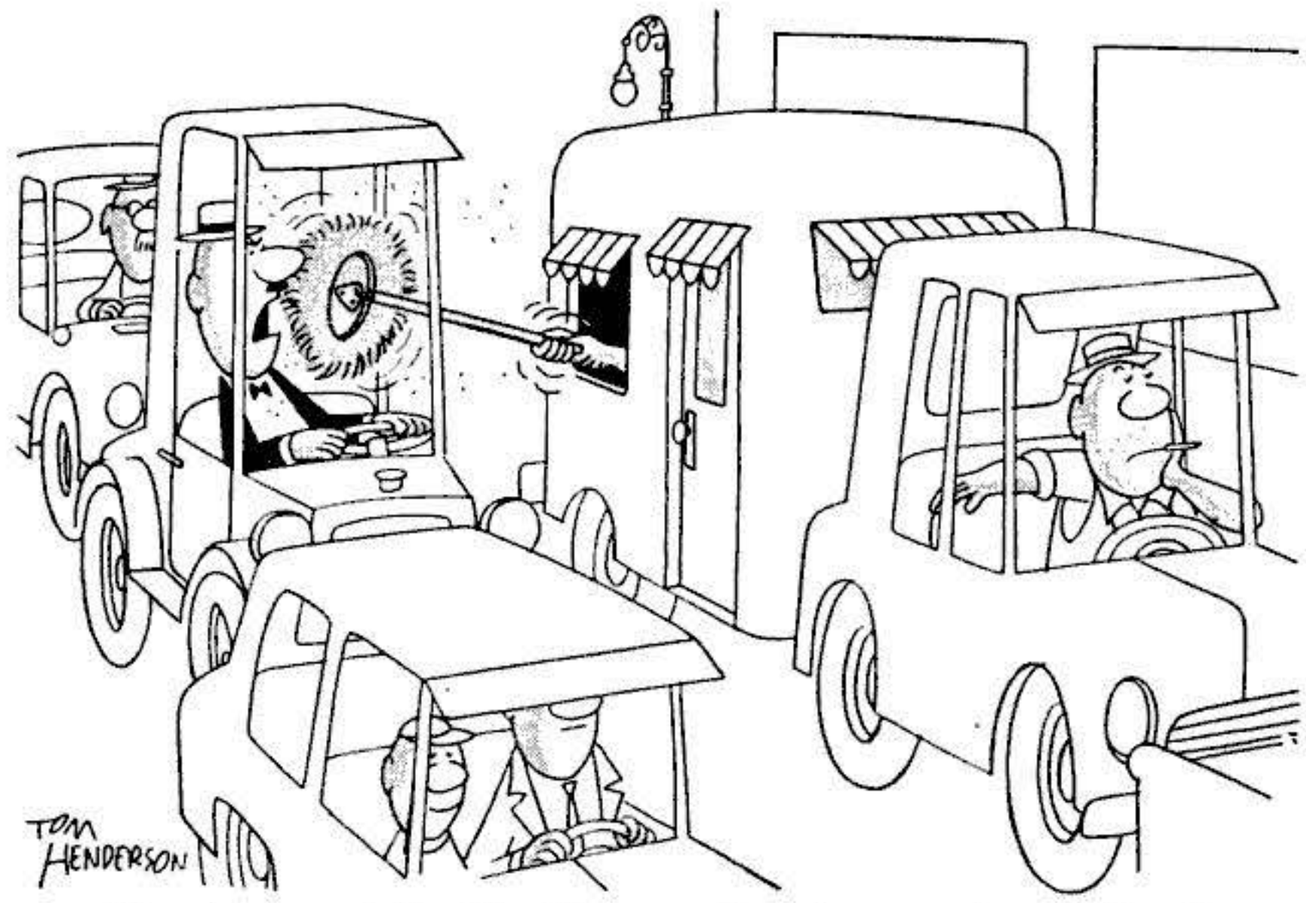
heard me start the engine and said it was out of time. Sort of galloped like the spark was early. Cost me a tune-up."

"How did it sound then?"

"Just the same—the starter dragged, kind of hitching itself around. So I stopped in Delaware. Fellow there put a meter on the starter. It showed a big voltage drop."

"Let's check," said Gus.

Disconnecting the charger, he hooked a voltmeter across the starter while Calladay turned it on. Despite a fresh boost in the apparently sound six-volt battery, the starter ground sluggishly.




*"Lady, wouldja kindly watch what you're doing!"*

"Voltage trouble?" asked Calladay.

"Looks that way," Gus admitted. "It shows a three-volt drop. Should be less than two. Commutator may be shorting . . ."

Through Gus's coverall sleeve, which lay across the battery as he leaned against the car, seeped an unmistakable warmth.

"How old is this battery cable?"

"Only a week," said Calladay. "Just after I started north, a fellow in a service station showed me the old one was in bad shape. He put on that one."

Gus flashed a light on it.

"That's your trouble, not the starter," he said. "Ever hear of voltage drop?"

Calladay grinned sheepishly. "Not before that fellow mentioned it. But it sounded hep, and I've heard of inadequate wiring, so I thought I'd try it on you."

Gus said nothing.

"I wasn't doing so good down in Florida. Swain is an old friend; he got me his job up here. I'm short of cash and had to make good, so I hated to start by okaying complaints."

There was a brief, awkward silence.

"Now here," said Gus, "your trouble really is voltage drop."

"But you boosted the battery."

"Sure. The voltage is there. But this cable's for 12-volt systems."

"Yeah, I noticed. So it sure ought to carry six in my car."

"Whoa," laughed Gus. "It's the amount of current that must flow through a cable that determines how big it must be. The starter in your six-volt system needs twice the current a 12-volt one would, and a bigger cable to carry it. That's where voltage drop comes in. Try to push current through a cable that's too small and the extra resistance causes excessive voltage drop. And remember, it's the voltage at the end of the line that counts —battery voltage minus voltage dropped on the way."

"I see," said Calladay. "Did the cold have anything to do with it?"

"This cold snap was just the last straw," said Gus, removing the offending cable. "A cold battery puts out less juice; and to make matters worse, thick oil makes cranking harder."

"Okay," said Calladay. "Now let's go back. Why did you say my starter needed twice as much current as a 12-volt car?"

"Simple multiplication," said Gus. "Electric power, which is what does the work, is voltage times current. With 12 volts, a car needs only half the current to get the same power." Gus grinned. "But don't try to switch your car over piece by piece. It's got to be designed for 12 volts from the beginning."

A brake squeal sounded outside. "There's your company service truck," Gus said. "Hope they fix the compressor. But I'll still charge you for a new cable."

"Fair enough," said Calladay. "I'll just consider it tuition for a course on voltage drop."



Copyrighted material

# WHY YOU CAN RELY ON YOUR ROCHESTER-GM SPECIALIST TO BOOST YOUR CAR'S PERFORMANCE

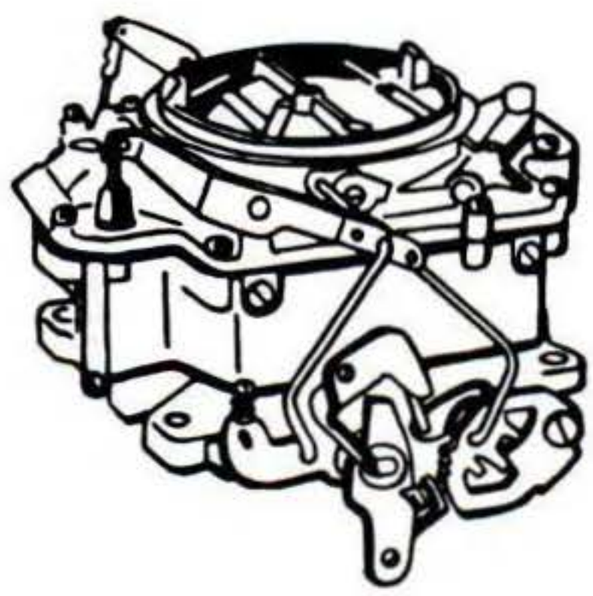
Your nearby Rochester-GM Carburetor Specialist is the man to see for new-car performance. First, he's factory-trained in the expert care of your original equipment carburetor. Second, the latest skills and tools are at his fingertips. He can save you money by restoring the reliable performance that was originally designed and built into your Rochester-GM Carburetor. Rochester-GM Carburetors are original equipment on more new cars than any other make—and remember this . . .

*expert training*

**qualifies your Rochester-GM Carburetor Specialist to do the most efficient and reliable job on your carburetor.**

**If top quality service is your business, ask your local UMS distributor about Rochester-GM replacement units . . . one of the many factory-approved service items in the fast-moving Rochester-GM service line.**

*Rochester Reflects Reliability*



*original equipment units*

**for replacement bring your carburetor up to date with the latest advances to save you money and stretch mileage.**

*original equipment kits*

**give your service specialist the reliable parts to clean and overhaul your carburetor and get it back to new-car operating condition.**

GM
America's number one original equipment carburetors

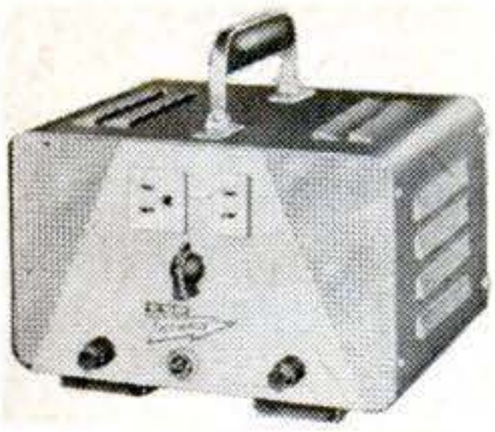
**ROCHESTER CARBURETORS**

GENERAL MOTORS



Copyrighted material

# The Miracle of Transistors Brings You 110 AC FROM BATTERIES



ESB PACKAGED POWER ACTIVERTER

©1960

## Dependable Power for Hundreds of Uses

Now — using a totally new concept in electronic design — the ESB engineers have developed a revolutionary, fully transistorized inverter-charger, the ESB ACTIVERTER. This major breakthrough in "packaged power" means that you can now have the convenience and the utility that 110 Volt AC current can bring, and you can have it wherever you can take a 12 Volt storage battery!

Just connect the ESB ACTIVERTER to a battery and you can have 110 AC instantly, anywhere, for many hours. You can plug in portable electric power tools, an electric blanket, electric lights, even a television set! A flick of a switch and the ESB ACTIVERTER fast or slow charges 6 or 12 Volt batteries.

## Compact, Rugged, Truly Portable

The compactness of the ESB ACTIVERTER design makes it possible to have a 12 Volt storage battery, an inverter, and a battery charger all in one self-contained and portable package. One PAK-O-POWER ACTIVERTER model provides a source of 110 Volt AC, with an output rating of 500 Watts, in a package the size of a portable picnic cooler! Because solid-state electronic components are used throughout, ACTIVERTERS are both rugged and lightweight. There are *no* moving parts, *no* vibrators.

## 4 Sizes — from 150 to 500 Watts

**MODEL I-152 INVERTER** — Inverter only, operates from direct connection to 12 Volt battery or through cigarette lighter socket of cars with 12 Volt systems. Output ratings: Intermittent Use — 150 Watts, 1.5 Amps. AC . . . Continuous Use — 125 Watts, 1.2 Amps. AC. Shipping Weight: 8 lbs.

**MODEL IC-252 ACTIVERTER** — Inverter-Charger operates from direct connection to 12 Volt battery. Output ratings: Intermittent Use — 250 Watts, 2.3 Amps. AC . . . Continuous Use — 200 Watts, 1.8 Amps. AC. Shipping Weight: 15 lbs.

**MODEL IC-202P PAK-O-POWER** — Inverter-Charger with compartment for 12 Volt battery. Completely self-contained unit. Output ratings: Intermittent Use — 250 Watts, 2.3 Amps. AC . . . Continuous Use — 200 Watts, 1.8 Amps. AC. Shipping Weight less battery: 22 lbs.

**MODEL IC-506S PAK-O-POWER** — The Multi-Service Inverter-Charger-Car Start unit, with large 12 Volt battery compartment and Car Start leads. Completely self-contained with built-in fast and slow charger — Charging rate: 60 Amps. for 6 Volt, and 40 Amps. for 12 Volt batteries. Output ratings: Intermittent Use — 500 Watts, 4.0 Amps. AC . . . Continuous Use — 300 Watts, 2.5 Amps. AC. Shipping Weight less battery: 55 lbs.

ESB PACKAGED POWER — THE ELECTRIC STORAGE BATTERY CO. Makers of Willard - Exide - GRANT - WISCO - Jordan

The Electric Storage Battery Co.
Automotive Division — Dept. PS-2
P.O. Box 6266 - Cleveland 1, Ohio
I want to use 110 Volt 60 Cycle AC for _____

Please send me ESB ACTIVERTER information without obligation.
Name _____
Street _____
City _____ Zone _____
State _____


### Why People Walk in Their Sleep

[Continued from page 128]

strike a match, or hold a flashlight in front of his eyes, he seems not to notice. His hearing is normal, but usually he will not answer questions. If he does talk, his speech is usually incoherent, repetitive, or meaningless. Dr. R. M. Mayon-White of London said in a recent issue of the English journal *The Practitioner* that sleepwalkers, when they do speak, usually ask: "Have you got it?" or "Where is it?"

A sleepwalker's arms, as he moves about, usually move as they would when he is awake. Contrary to the cartoons and the scenes in slapstick movies about sleepwalkers, they do not walk with their arms outstretched.

***Should you wake him?*** Another myth says that it is always dangerous to awaken a sleepwalker. Physicians explain that it is risky only when the walker is discovered in some perilous place, such as a high window. Startling him may make him lose his balance. In any case, it may unduly excite him and make him unable to go to sleep again that night.

"The best thing to do," says Dr. Bruno Gebhard, director of the Cleveland Health Museum, "is to touch the person gently, and speak quietly to him. Tell him where he is. Let him know he is sleepwalking. Then lead him back to bed."

Dr. Gebhard advises parents that if their child has a habit of sleepwalking, as many do, he should be awakened the same gradual way. Also, he says, "Stay with the child for a while after you have him safely under the covers again. Explain sleepwalking to him, but don't go on about it. If you make it sound too important, his subconscious may be tempted to repeat the episode."

When either a child or an adult persists in these nightly prowls, a physician should be consulted. You may need to explore to see if there are any deep underlying causes of his sleepwalking.

***Is there a cure?*** Nearly all cases of sleepwalking can be cured without any prescribed treatment. Says Dr. Gebhard: "The best remedy is for the somnambulist to recognize and understand his own worries and wishes and to talk about them. You try to uncover the basic trouble and reduce or eliminate it."



CONTINUED

Copyrighted material

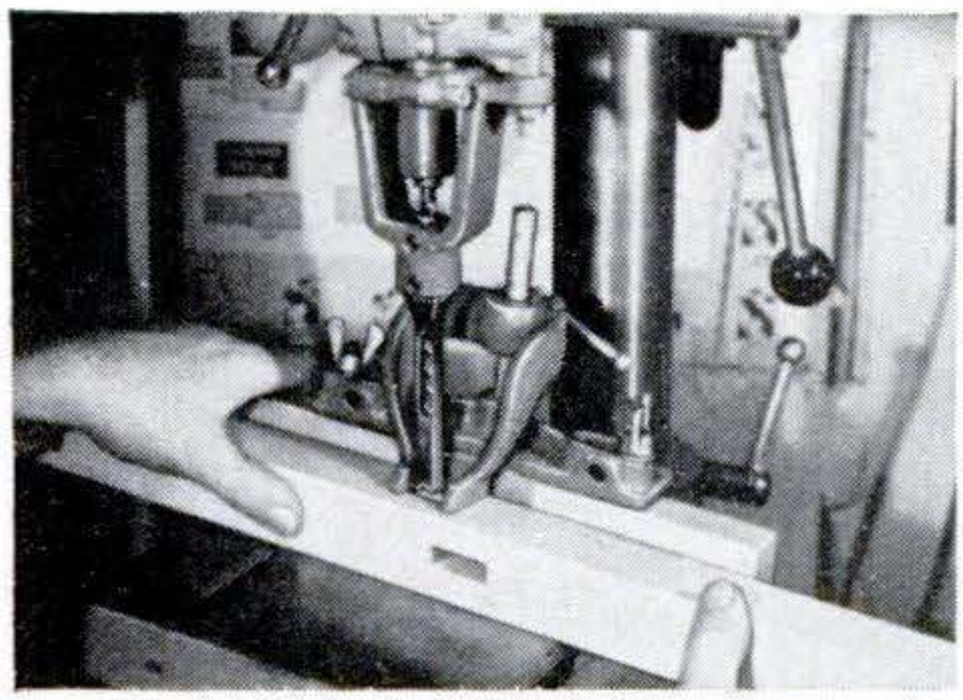
# SHOP FULL OR SINGLE TOOL

# you can do more with DELTA

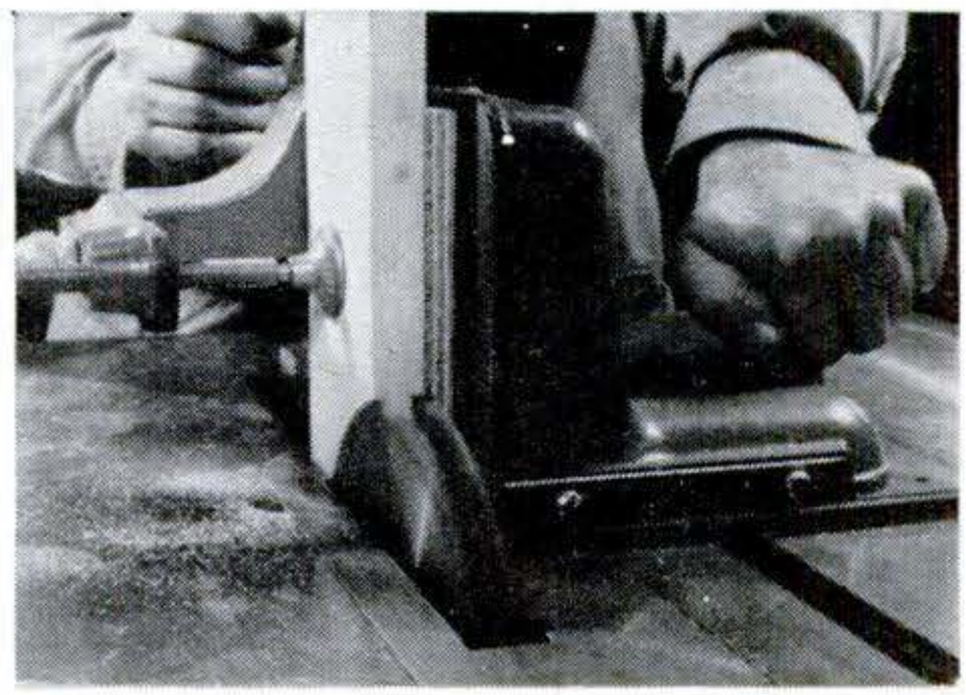
Every tool you choose for your workshop should deliver more than just extra capacity to handle your latest project idea.

You'll want built-in precision you can rely on for years to come—versatility that extends the range of useful jobs you can do—advance engineering features to give you convenience and safety that can double your shop fun and relaxation. Delta Power Tools give you these important advantages.

So whether your "dream shop" plans include a tool for every operation, or simply several basic tools equipped with low cost accessories to handle a wide variety of applications, plan now to see Delta tools. No other power tool line is more complete—or can help *you* do more.



Mortising attachment fits both the Delta 11" Drill Press and 32" Radial Drill Press. Gives you cabinetmaker accuracy in cutting the mortise part of the much-used mortise and tenon joint.



Tenoner is designed for use with 9" and 10" Delta Circular Saws, provides easy, one-hand operation. Combination of saw blades can be used for making this cut in a single pass.

**FREE CATALOG**—Shows every tool in Delta's Homecraft line plus full range of money-saving accessories for each. Write: Rockwell Manufacturing Company, Delta Power Tool Division, 504C N. Lexington Ave., Pittsburgh 8, Pa.

DELTA POWER TOOLS

another fine product by

**ROCKWELL**

Copyrighted material

# PAINT THRU RUST

NEW additive* lets you paint over tight, non-scaling rust because it penetrates through to the metal; seals against further rusting... PROTECTS LONGER THAN ORDINARY "RUST PAINTS." Rustmaster enamel available in colors. *Patent applied for.

# RUSTMASTER

QUALITY Glidden PRODUCTS

General Paint

Pacemaker In Paints

The Glidden Co. • Cleveland 14, Ohio • West Coast: The Glidden Co., General Paint Co., 1000—16th St. San Francisco 7, California • In Canada: The Glidden Co., Ltd., Toronto, Ont. Rustmaster also sold by dealers for CLIMATIC HEATH & MILLIGAN • ROYAL • MOUND CITY.


### *Why People Walk in Their Sleep*

Experts agree that the chances of a sleepwalker harming or killing someone are small. An individual's sense of right and wrong is pretty much the same, it seems, as it is when he is awake. There are stark exceptions—an Englishman who knifed his wife to death, an Arkansas father who fatally beat his four-year-old daughter with a flashlight.

Dr. Edward Podolsky of Brooklyn, N.Y., writing of "somnambulistic homicide" in a journal of psychiatry and neurology, *Diseases of the Nervous System,* tells of a Mount Vernon, N.Y., man who shot and killed his wife while he was sleepwalking.

The husband testified that he had not awakened from his sleep until several hours after he had committed the crime. He said that he did not even hear the shot he fired. The doctor said the jury found it hard to believe until medical evidence convinced them that a sleepwalker could sleep through any kind of activity, "however noisy and explosive."

***Night rider.*** Sometimes there is no explaining how tragedy is averted in the sleepwalker's misty world. Take the case of a woman in Berkeley, Calif. She threw back the blankets, pulled on slacks and coat, went to the garage, and drove away in her husband's car. She awoke, beside a freeway, 23 miles from home.

"When I came to, the car was stopped and I was pounding my fists on the dashboard," said Mrs. Albert J. Wollner. "The lights wouldn't work. I suppose I was hitting the dashboard to get them on. It must have been the pain that awakened me."

Science today, despite all of the research and study in sleepwalking, still does not comprehend what is behind all of these curious manifestations.

Shakespeare's doctor, in the tragedy *Macbeth,* probably best summed up the mystery of sleepwalking when he said: "This disease is beyond my practice."

***Next Month: Ticklish? Most of us are. One girl nearly lost her fiance because she laughed when he kissed her. His mustache tickled. Read what scientific "tickle tests" reveal about this everyday human reflex—in April PS.***



Copyrighted material

# COMMAND PERFORMANCE— WITH *GRAVELY* POWER!

## Unmatched Performance— Unmatched Versatility!

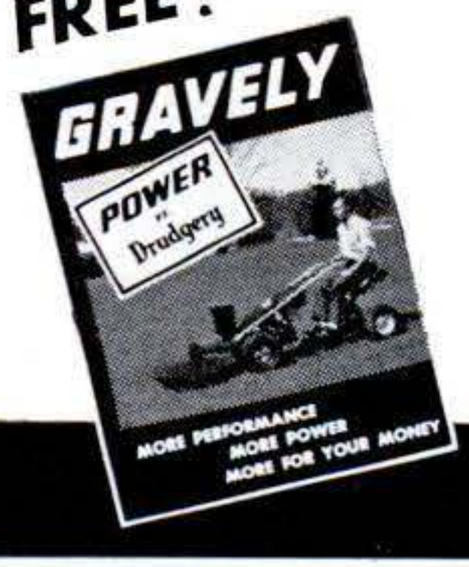
The moment you take command of a Gravely Tractor you'll discover the *performance* you've been looking for. No pushing, pulling or pampering this tractor . . . you just guide the Gravely while it makes your toughest jobs easy!

All-gear drive, power reverse, optional electric starter. *More power at the tool.* And the Gravely keeps working—year after year.

## ONE Tractor—30 year-round Attachments

RIDE while you mow with 30″ Rotary Mower, 30″ Reel Mower, 75″ Gang or 42″ Sickle. Choose the right tool for your job . . . and you are ready for the toughest rough or finest lawn. Plow and cultivate with Power; haul with NEW Power Barrow Attachment . . . with Gravely you are ready for *any* job that needs to be done to make your place a show place! Choose from four mowing tools, four garden tools, four snow removal tools, the *right* tools for the job . . . 30 in all.

FREE!




## Big, 24 page Booklet, "Power Vs. Drudgery"

Illustrated with action pictures, some in color, FREE "Power Vs. Drudgery" shows how Gravely solves your lawn, garden, field and farm problems. Write Now!

# GRAVELY TRACTORS

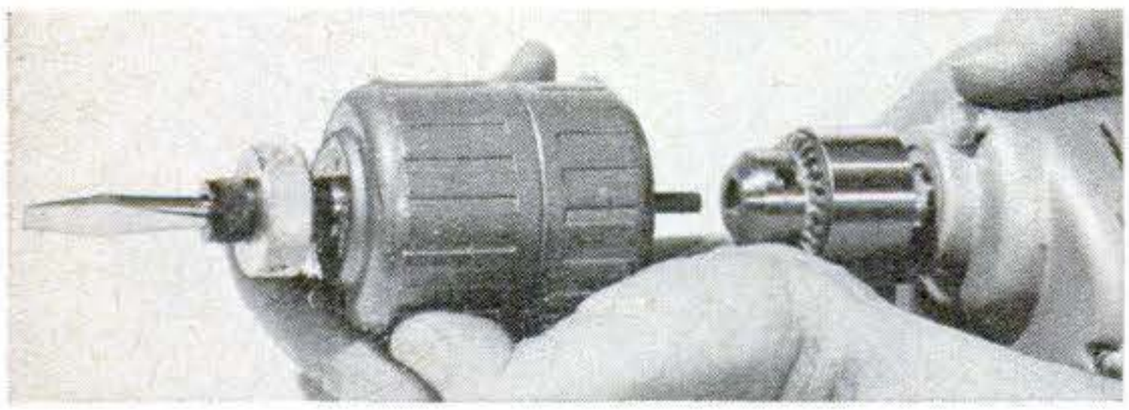
**P. O. Box 602-C** **Dunbar, W. Va.**

**Sold & Serviced by Authorized Gravely Dealers**

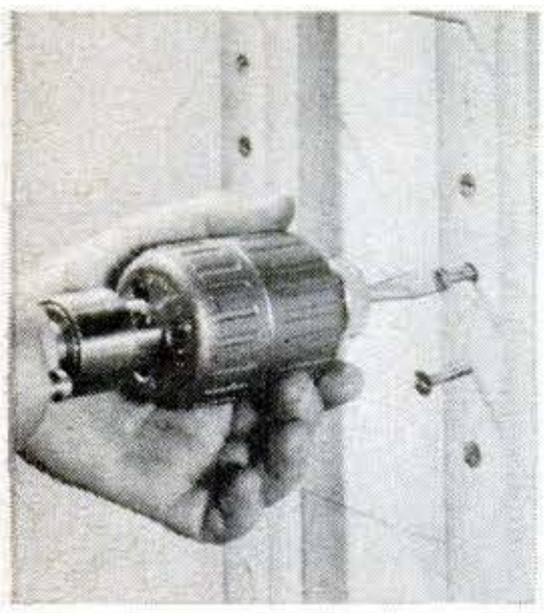


Copyrighted material

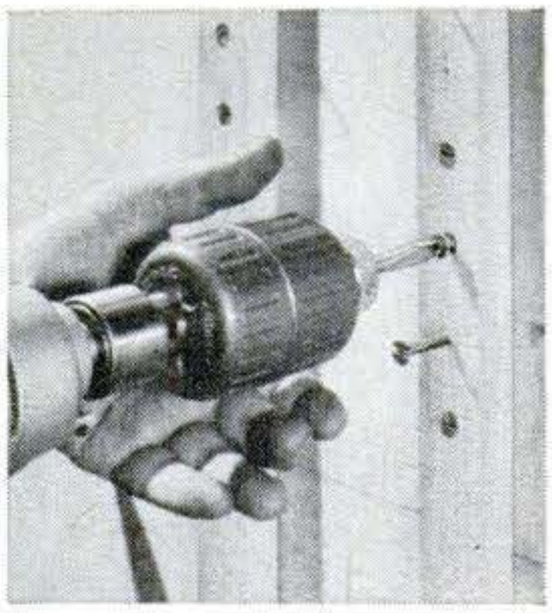
# THE EASIEST WAY IN THE WORLD TO DRIVE AND **REMOVE** SCREWS



**1.** After drilling pilot holes simply attach a Versamatic to electric drill. Fits any make.

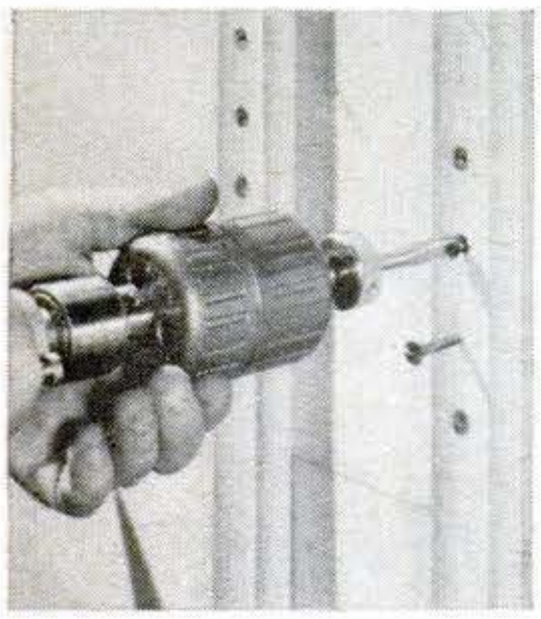


**2.** Place screw in hole; drive it easily with slight forward pressure . . . hold housing in fingertips.



**3.** Your fingers act as a clutch . . . starting, stopping action instantly. Simple and safe . . . no blisters.

## **Versamatic** puts your power drill into **low gear**...



**by means of 7 to 1 speed reduction. Gives your drill 7 times more power.**

**Supreme Versamatic**

**4.** Versamatic runs in reverse for removing screws. You won't believe how easy it is until you try it.

MADE BY THE MAKERS OF SUPREME BRAND CHUCKS

SUPREME PRODUCTS CORPORATION
2222 S. CALUMET, CHICAGO

Sold by leading tool dealers...$14.95 list

PRECISION A·S·R PRODUCTS


### *The Ticklish Job of Air Refueling*

[*Continued from page 100*]

Just keep your wings parallel with the tanker's and do what the lights say."

This time I get in all right, and manage to hang on for a few minutes. As soon as I settle down in contact, the tanker starts pumping fuel, at 600 to 900 gallons per minute. I have to stay hooked up for about six minutes—and those are long minutes.

Penzien is coaching me: "Easy now on those throttles—*easy, easy*—not so much pitching, you're overcontrolling—just make those corrections smooth—there, that's good position."

Naturally, as soon as he says that I'm in good shape, I go to pieces. I start overcontrolling again and soon get a porpoising action. The boomer can hardly keep up with me: "Up two—up four—down two—down four—disconnect."

***I back off to settle down*** and rest a minute and then drive in again past the end of the boom and into position. The nozzle clunks into the receptacle and somehow I stay in contact for a few more minutes. I ought to have about all of the fuel by now, I think.

But the tanker pilot reports, "You have 20,000 pounds. Ten more to go. Are you ready?"

Penzien continues, "Come on, now, you're too high, get it down—now you're too low—watch it! Don't get so far forward."

If you go past the forward limit too fast, the boom may not be able to disconnect fast enough to avoid being broken. More than one bomber has landed with a boom planted in its receptacle, and the tanker minus some plumbing.

With my last reserves of strength, I hold the 52 to a draw, and finally the tanker pilot says, "You have your scheduled off-load."

"Roger," I reply. "Disconnect on my count of three—one, two, three." I push my disconnect button and drop down and away from the tanker.

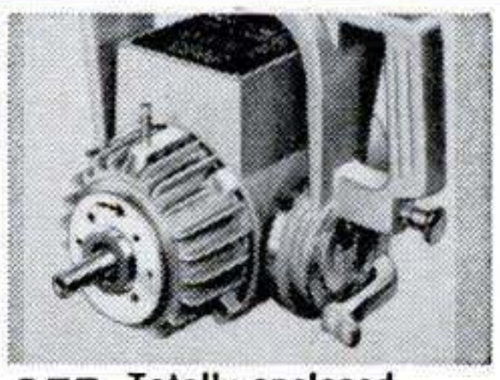
Some day there won't be any more tankers, and air refueling will be a thing of the past. Tomorrow it may be the reentry-from-space maneuver that the pilot sweats out. But today, the guy hanging on the business end of a refueling boom has one of the toughest jobs in flying.



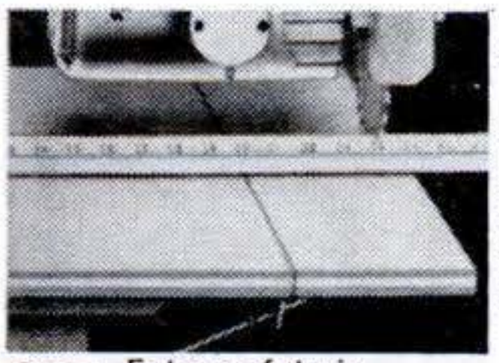
Copyrighted material

# SEE your "extras" in new DeWALT!

**SEE** Built-in motor brake stop saw instantly

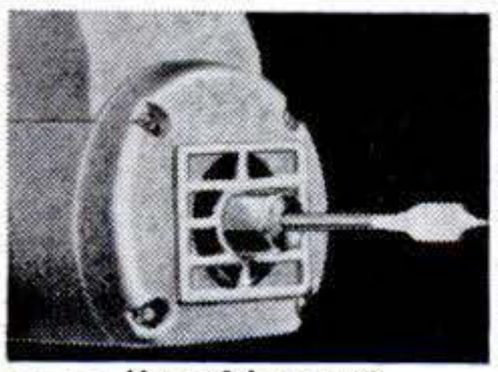


**SEE** Totally-enclosed 2 H.P. motor



**SEE** Extra safety in drop-leaf table

**SEE** Cut-off scale speed repeat cuts



**SEE** Use of low-cost right hand tools

**SEE** Roller bearings ride quietly, smoothly

Go now to your nearest DeWalt dealer and ask for a free demonstration of this great new model 925-H. It's loaded with exclusive VALUE features you've been waiting for. See it...test it yourself...and you'll surely want to own it!

**DeWALT, Inc.,** Dept. PS-361
A *Black & Decker* SUBSIDIARY
Lancaster, Pa.

☐ Please send me free 20-page CATALOG.

☐ Please send me name of nearest dealer.

Name_____

Address_____

City_____ State_____



Copyrighted material

# BOLENS

## small tractor with big ideas

New Bolens Ride-a-matic Tractor looks and acts big, but its cost and handling ease give away its secret. It's just the tractor for countless lawn and garden tasks . . . safe and easy enough for everyone from Junior to Grandpa to handle. New Versa-Gear Drive, automotive-type transmission and steering, sporty streamlined styling and every kind of attachment you'll ever need for lawn, garden, utility and snow removal jobs. Have your Bolens dealer demonstrate the Ride-a-matic Versa-Gear. Send a postcard for his name and a free "Home Gardening Handbook."

BOLENS Food Machinery & Chemical Corporation
Port Washington 30, Wisconsin

*America's Finest Outdoor Power Equipment*

FREE CATALOG!

**TREMENDOUS SAVINGS ON HUNDREDS OF SURPLUS AND NEWLY MANUFACTURED ITEMS!**

New 1961 edition contains over 50 pages of tools and equipment for farm, home, workshop, factory. Hydraulic equipment, pumps, motors, construction and diesel equipment and parts!
Write for your FREE CATALOG Today

**GROBAN SUPPLY COMPANY**
1139 South Wabash Ave., Dept. F-3 Chicago 5, Ill., WEbster 9-3793

# Cleaned
*good as new with*
**IMPERIAL**
**BRUSH CLEANER**

Brushes caked with hard paint are cleaned in minutes with Imperial. Leaves bristles glossy and springy—perfect for painting. At paint and hardware stores.

● **Send 25¢ for illustrated Refinishing Manual**
Write for free folder "Care of Paint Brushes"

Wilson-Imperial Co., 121 Chestnut St., Newark 5, N. J.


## They Bait Their Nets for Junk

[*Continued from page 109*]

proached we saw that it measured about 40 by 20 feet.

"When we get a piece too big for our nets, we either secure it alongside or haul it aboard," Noonan told us. "I'm going to haul this baby on deck."

Noonan worked the Driftmaster close to the drift. Then, manipulating levers in the pilot house, he jockeyed the boom over the giant piece of flotsam and encircled it with two wires.

Slowly he eased back on a lever, and the giant mass rose from the water. It was built of 12-by-12 timber and was 5 feet thick in some spots.

"Weighs about 10 tons," said Noonan.

***Bagging the limit.*** With the drift safely secured across the deck, Noonan ordered the second net lowered, and the Driftmaster resumed normal operations. Pretty soon the second net was bulging with drift.

"What do you do now?" I asked.

"You'll see," Noonan said. "We're heading for the incinerator barges."

The trip to the barges took about 20 minutes. En route, Noonan explained that the Army Corps of Engineers has been responsible for keeping New York Harbor clean since 1915. It operates a fleet of four vessels to do the job, but the Driftmaster is the only one specially designed for the work.

About 12:45 p.m. the Driftmaster arrived at the burning barges, one steel and the other concrete. The concrete one had a steel firebox built on deck. There was a layer of sand in the box to insulate it and to absorb some of the residue.

With the Driftmaster alongside, Noonan again worked the pilot-house levers to empty the nets. It took 10 minutes.

Kerosene was sprinkled on the pile, a mass of oil-soaked rags tucked in, and a match struck. Before we were 100 yards away, the fire was burning fiercely.

Then we went back to work, sweeping New York Harbor. When the day was over I asked Noonan if he thought the Driftmaster would ever be put in mothballs.

"Not much chance," he said. "There's more and more drift every year. This puddle jumper"—and he patted the Driftmaster's wheel affectionately—"has her work cut out for years to come."



Copyrighted material

**IMPROVES CIRCULATION!**

Doctors tell you that *increased action* of *the main body muscles* will instantly step up your circulation. If your circulation is sluggish, increasing the rate of flow through your arteries and veins will make you feel and stay more youthful and you'll look better. Where blood circulation is poor, EXERCYCLE helps the vital organs to function more efficiently, helps the processes of elimination and the removal of wastes. The normal heart, lungs and brain all benefit from stepped up blood circulation.

**SMALL, SILENT AND ECONOMICAL!**

EXERCYCLE is so small, compact and silent most users keep it in their bedrooms. Fits into any small nook or corner. You can ride it while others sleep. Plugs into any wall socket. Uses less electricity than TV set. Buy it on easy terms.

**NOW MILLIONS CAN ENJOY**

# *Youthful energy after 35!*

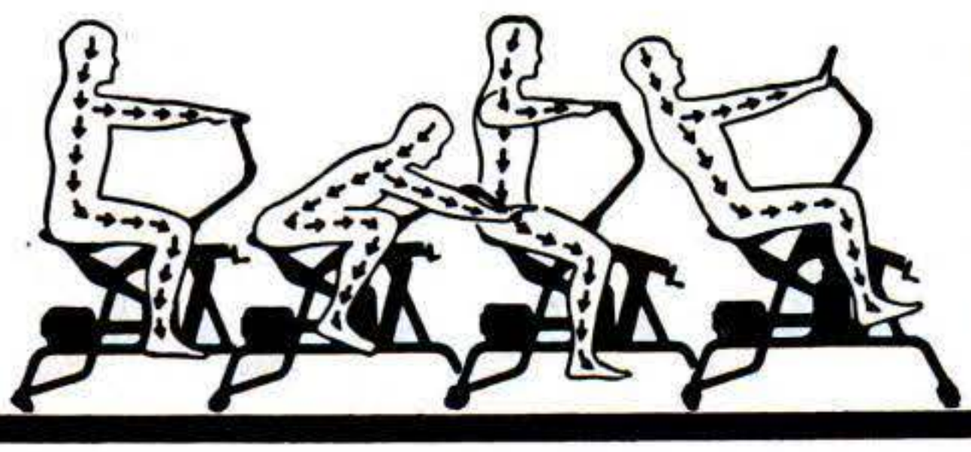
**New, modern, electric exerciser keeps you Fit, Trim, Active and Youthful!**

IT'S no longer necessary to twist, bend, strain and deplete your energy in order to keep yourself slender, active and youthful. And you can stop struggling with yourself and with manually operated devices. For there's nothing that can put you back into good physical shape faster, easier and safer than this amazing EXERCYCLE.

In less than 5 days, any normal adult, regardless of size, weight or sedentary condition, can, with the help of this wonderful automatic exerciser, simulate the fast, vigorous movement of the expert cyclist, runner, swimmer, rower or gymnast. Yes! In less than 5 days, you'll be doing exercises that will simply amaze you, and at a pace that will delight and astound you.

Send for FREE EXERCYCLE LITERATURE now and learn what tens of thousands of men and women know, that there is no form of vibrator, bath, massage, reducing or slenderizing technique that can take the place of ACTION OF THE MAIN BODY MUSCLES. Turn your spare moments into improving yourself physically and enjoy the many blessings that daily exercise can bring your way.

**Helps body muscles to become stronger, firmer and more flexible without manual effort on your part**



*Relaxed or active exercises!*

EXERCYCLE is fully adjustable to your present and future physiological needs. There's no limit to how easily or actively you can exercise with it. It builds you up gradually, allowing you to expand your activities as your muscles become stronger and more flexible, without ever exceeding your limitations.

**EXERCYCLE CORPORATION**
**630 THIRD AVE., N.Y. 17, N.Y.**

Please send me at once, without cost or obligation, material on Exercycle, including articles by doctors.

Mr. / Mrs. / Miss _____
PLEASE PRINT

Address _____

City _____

Zone _____ State _____

Telephone _____

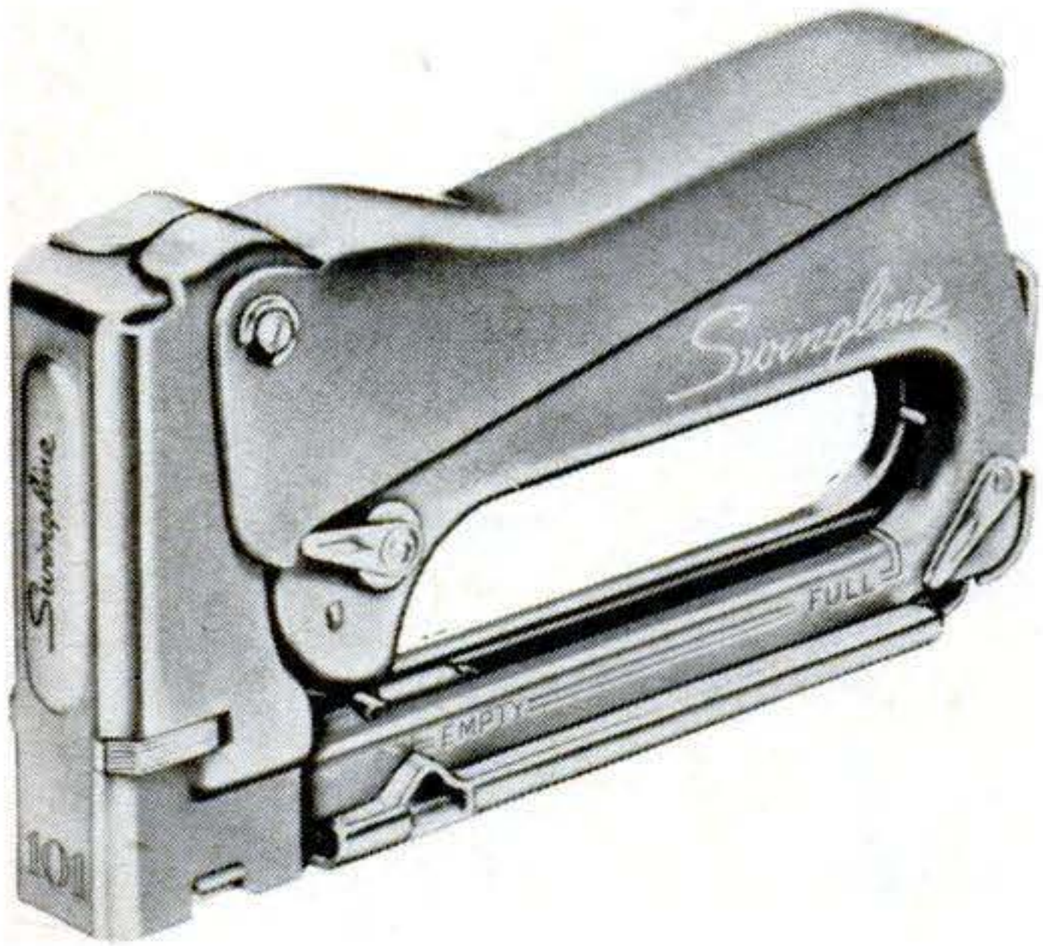
63



Copyrighted material

# Insulating, upholstery, carpets...

thousands of other uses.




Swingline

## 101 STAPLE GUN

only **4.95**

This rugged, high compression steel staple gun delivers as much driving power as machines twice its size and weight. You'll find it as indispensable as a hammer and screwdriver for the 1001 chores around your home and workshop. Exclusive push-button loading and built-in staple extractor. Positively will not jam. At stationery, department or hardware store.

SCREENING—WIRE FENCING

Send for NEW FREE 8-page booklet "Tips for Tacking."

Swingline INC.

32-00 Skillman Ave., Long Island City 1, New York




[*Continued from page 63*]

wrong-side cuckoo who had been sopping up drinks since afternoon. It had been the same old story: headlights, scream of tires, an explosion of glass, chrome, and dust. One woman died. The other was alive, technically, when they took her from the wreck.

At 12:38 a.m. we passed an inn and heard a racket at the bar. Then we saw two men loitering in shadows near parked cars. Car thieves? Waite pulled off the road and cut his lights.

A burst of singing and shouts from the inn. The lights inside blinked for closing. Then the two men we'd seen before staggered out into the road. They were in bad shape. They began trying to flag cars on the busy road.

Waite was worried. "Somebody," he said, "is going to get hurt." He pushed a button and the green car-to-car light came on. He said into the mike, quietly: "TS18 to TS17. Where are you, please?" We knew Trooper Bernard Peterson in TS16 had just gone north and Walt Trella was up there, too. Jim Jacob was south in TS14, and Jerome Nepiarsky was coming out of Danbury in TS12. TS17, Charley Hyatt, probably was closest.

TS17 answered: "I'm a mile north."

"Got a coupla drunks on the road," Waite said. "Want to come up and get 'em out of here, TS17, before they get hit?"

Hyatt rogered. A moment passed, and we saw his lights. His cruiser stopped right beside us, facing the same way. He called over to the drunks and talked them off the road.

AT 12:52 p.m. we heard new shouting from the inn. Lights blinked again. Suddenly our radio was saying: "Did you see that?" It was Hyatt.

We saw it, all right. The front door of the inn opened and a tall, wiry man in a bright red jacket ran out. Then he fell flat on his face.

Instantly he picked himself up, got in his car, started the motor. Events now happened in split seconds.

The car, a yellow Pontiac from Ohio, shot out backward, skidded to a stop, then came forward. It turned, heeling sharply, and the headlights bored into our car. It was going to ram us.



CONTINUED

Copyrighted material

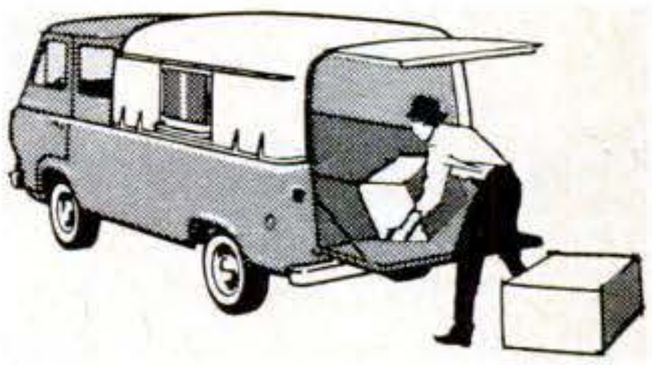
# Saves it up all week!

Need a pickup in your business? Here's America's lowest-priced pickup—bar none! $22 to $260* less than conventional pickups! Proven gas economy with the 144 Falcon Six engine. Big 7-ft. box carries over ¾-ton payloads!

# NEW FORD Econoline PICKUP

# Lives it up all week end

Newly designed lightweight fiberglass sports body attaches in seconds!



Provides easy-access covered loadspace, too!

Like to fish, hunt, beachcomb? Enjoy life best "away from it all"? Then you'll go for this newest idea in vacation fun—a modern Ford Econoline Pickup with removable camper body! Forget the timetables, forget the reservations—take off for a week or a week end whenever and wherever your fancy takes you! Forget, too, the expense of planes, trains, rooms; you travel with the snuggest living and sleeping quarters you could want! Now you can save money two ways—in business and in pleasure—with a new Ford pickup and a camper body . . . many types available . . . see your Ford Dealer for full information.

FORD DIVISION, *Ford Motor Company*

**Based on a comparison of latest available manufacturers' suggested retail delivered prices*

**FOR FULL INFORMATION ABOUT TRUCK AND CAMPER-BODY MODELS SEE YOUR FORD DEALER!**

# FORD TRUCKS COST LESS

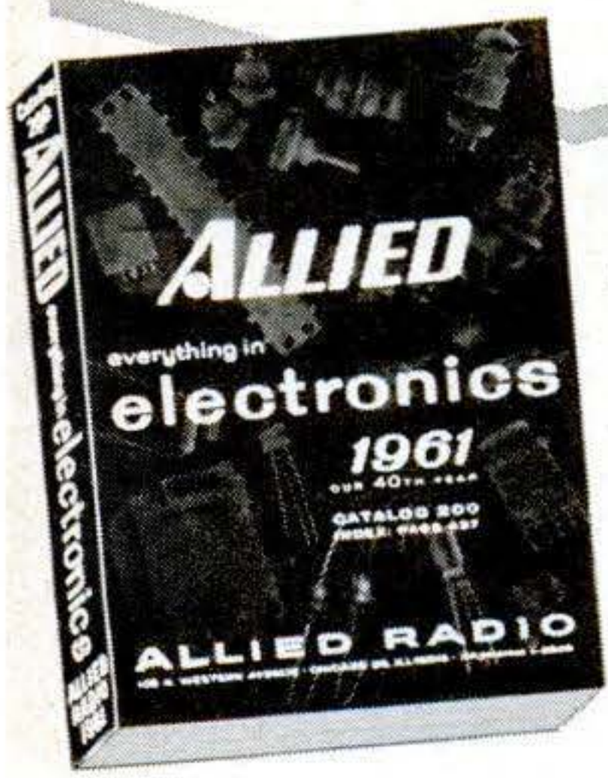


Copyrighted material

Simply Great!

ELECTRONIC
knight-kits®
A PRODUCT OF ALLIED RADIO

A PLEASURE TO BUILD
and YOU OWN THE BEST




featured in the
big 444-page 1961
ALLIED
ELECTRONICS
CATALOG
free

KITS FOR
EVERY NEED
Stereo Hi-Fi
Hobby
Instrument
Amateur

BIGGEST SAVINGS
Know the thrill of building your own money-saving electronic equipment. Make your selection from the complete KNIGHT-KIT line—available only from ALLIED. Lowest in cost, convenience-engineered for easiest assembly, best for performance; satisfaction guaranteed or your money back. Send today for the 1961 ALLIED Catalog—select exciting KNIGHT-KITS—and...

SAVE ON EVERYTHING
IN ELECTRONICS

Get more for your money in: Stereo hi-fi systems and components • Recorders and tape • Citizen's 2-way radio • Amateur station equipment • TV tubes, antennas, accessories • Test instruments • Electronic parts, tubes, transistors, tools. Send today for your FREE 444-page Allied Catalog!

only $2 down
on orders up to $50

FREE
catalog

ALLIED RADIO

ALLIED RADIO, Dept. 27-C1
100 N. Western Ave., Chicago 80, Ill.

☐ Rush FREE 1961 Allied Catalog No. 200

*Name*_____
PLEASE PRINT

*Address*_____

*City*_____ *Zone*____ *State*____

### Catching Drunk Drivers

Then it swung. It was going to ram TS17, instead.

Hyatt had no time to get out. The car came at him, and then, with a humping skid, stopped bumper to bumper with the police car. The driver sat and hammered his horn, trying to blast Hyatt out of the way. Hyatt got out to collar him.

Then the fellow went off the deep end. He backed, turned, and, spitting gravel, blazed off. Way down the road we saw several pairs of lights coming. Waite said, "My God, he's on the wrong side! He's going to hit somebody!" We didn't know it, but the first oncoming car was Walt Trella's.

HYATT ran back to TS17. We didn't wait for him but went out like a Texas tornado. Then we saw a parked car ahead. It was Peterson in TS16, a blue Ford. Waite barked into the mike: "Get him quick, Pete, before he nails somebody! He's a real cuckoo!"

We saw Peterson jump out, flash in hand. The car nearly ran him down. The oncoming headlights were right ahead now. When a crash seemed inevitable, the first car spun out of his way. As we went by we saw Trella in TS13 up on the grassy bank. He whirled and followed us.

More headlights ahead. We had to get between them and the drunk we were chasing. Our red flasher came on and our siren went up about 20 octaves. The bass notes came from that Thunderbird Interceptor. Then for an instant the Pontiac weaved over. Waite saw his chance. We hurled past, cut him off, and skidded.

When the tires stopped howling we had him blocked. The oncoming car, seeing our red flasher, stopped. The cuckoo also stopped and lurched out, leaving his car rolling. Walt Trella ran up and set the brake. The driver fell flat—this time on his back. The troopers picked him up. But first, staring up into their flashlights, he giggled, "It's a good thing I'm not drunk." Nobody laughed.

On the way to jail this man wanted to fight. His blood tested .24 of one percent alcohol; he was "stoned." Before we resumed patrol we stopped in a diner for coffee. Nobody said much. We all realized that, besides gambling his own life, this



CONTINUED

Copyrighted material

# More power to you!

- **50% increase in horsepower . . . now up to 9 hp.**
- **Improved Scootaway transmission**

For fast starts . . . for that something extra in traffic, you just can't top the new Harley-Davidson Topper "H." Engine and transmission design improvements give it new zip and zest!

Engine compression has been raised to 8:1. New, larger carburetor — new, larger, more flexible air intake — new poly-urethane foam plastic air cleaner — new tuned, tapered muffler — all add up to improved running efficiency.

Important improvements in the Scootaway automatic transmission also contribute to handling ease and smooth performance. See your Harley-Davidson dealer for full details. Or write direct to Harley-Davidson, Dept. PS.

A 5-hp Model "U" Topper is also available to comply with junior licensing laws in some states.

## on the NEW HARLEY-DAVIDSON TOPPER "H" MOTOR SCOOTER

**HARLEY-DAVIDSON MOTOR CO.**
**MILWAUKEE 1, WISCONSIN**

---

# *New* PENN YAN BOAT CATALOG

**FREE**

Outboards, Inboards, Cabin Cruisers, Hardtops, etc.

**CATALOG** loaded with big illustrations in full color. Complete descriptions of Penn Yan line for '61—latest ideas in marine design—boats for cruising, fishing, skiing, for big water, inland lakes and rivers. 7′ to 23′. Also Cartops®, canoes. All clinker-builts feature exclusive Penn Yan *Vulcanile Bonded Laps*—seams flexibly bonded *forever*.

## Your Choice of Wood or Popular Fiber Glass

Both types now available. Wood boats protected by amazing Boat Life Process, preventing hull deterioration. New catalog is a *must* for anyone considering a boat. *Write today* for yours FREE. Penn Yan Boats, Inc., 35 Street, Penn Yan, N. Y.

---

# only PROTO makes screwdrivers like this

Proto Screwdrivers are available in a complete range of sizes and types, including: plastic and wood handles; keystone, cabinet, Phillips, and clutch-head tips; round and square shanks; lengths up to 2½ feet; offset type; screwholding drivers; and screwdriver sockets.

*See your Proto Auto Jobber; Builders Supply, Hardware Dealers, and Industrial Distributors for professional quality tools, parts, and equipment.*

DIVISION OF PENDLETON TOOL INDUSTRIES INC.

**PROTO TOOLS**

2203 Santa Fe Ave., Los Angeles 54, Calif.
503 Allen St., Jamestown, N.Y.
1703 Oxford East, London, Ontario, Can.

**Send 25c with your name and address for fully illustrated Catalog of over 2300 Proto Tools.**

Copyrighted material

LAVISHLY EQUIPPED 15 FT. ALUMINUM LAPSTRAKE RUNABOUT FOR $635!*

Once again the 15 ft. Starcraft aluminum lapstrake Jet '61 is the biggest boating value available anywhere. The clean horizontal lapstrake lines bring the graceful contours of the boat into sharp focus. Lapstrake design also means a frisky, full-of-fun performance with up to 55 h.p. motors. Unitized hull and frame add amazing strength and banish annoying noises. This completely equipped Jet '61 is guaranteed 15 years against popped rivets and skin punctures. Write for color catalog.

*Plus freight and handling.

STARCRAFT

STARCRAFT BOAT COMPANY
Dept. PS-3 • Goshen, Indiana

(Item 24)

World's THRIFTIEST Light Plants

**700 Watt,** push button start, 115 v. 60 cyc. AC. 2.2 HP, easy starting Briggs eng. No wiring necessary; just plug in and operate. Plenty of current for any oil burner, freezer, brooder, emergency lights, etc., which require up to 700 watts. Ideal for television and radios. Complete with voltmeter and built-in winding to charge 6 v. auto batteries. (Item 24) Wt. 75 lbs. Easily fits in car trunk. Be prepared if storm knocks out power lines. Reg. $275 .. **$149.50**

**1500 Watt Plant** (Item 45) same as item 24 but larger generator and engine with 50% greater output ..... **$199.50**

ELECTRONIC BRAIN Now Available On All Our Plants—Write

MASTER MECHANIC MFG. CO., Dept. B-361 Burlington, Wis.

Southern Customers Order from Dept. B-361, Box 65, Sarasota, Florida

Works in seconds!

Loosens Rusted Bolts
nuts, screws, "frozen" parts!

LIQUID WRENCH®
SUPER-PENETRANT

The super-penetrating rust solvent that quickly loosens rust and corrosion.

AT ALL HARDWARE AND AUTO STORES

RADIATOR SPECIALTY COMPANY
CHARLOTTE, N. C.

SOLDER SEAL




fellow had come awfully close to killing several people that night.

EACH car in the patrol carried a quiet little psychological weapon: a neat package of printed notices. Each "DD" arrested got one—telling him where Alcoholics Anonymous meets and when.

This was a shock to some, a help to others. "A lot of these drivers are real alcoholics," says Commissioner Mulcahy. "The others get something to think about."

Mulcahy has other weapons up his sleeve against cuckoos. One is to warn roadside taverns to quit serving drunks. Reputable places, he says, are beginning to cooperate.

THE drunk tests for which we were equipped are not mandatory. But most drivers arrested as "DDs" took them; sometimes they get a man off the hook by proving he isn't drunk even though he seems to be. Samples—blood or urine—are checked out in a lab before trial. Anyone testing .15 of one percent alcohol in the blood is legally drunk in Connecticut. Over .15 is, in police talk, "stoned." And from .28 to .30 is "dead." It is the "stoned" and "dead" drivers, police say, who are the cuckoos.

Other patrols carry such kits—and lately instant-test breath balloons have been added. But the satellite patrols use them most of all. There's a reason for this. Ordinary patrols are so busy with miscellaneous duties that they can't put in much time on any one of them. But Mulcahy has seen to it that his satellite patrols have only one job: making traffic safer.

Lately Vermont and New Jersey have tried satellite patrols; other states may follow suit.

What does the public think? The night we stopped the 110-mile-an-hour Oldsmobile, two local citizens walked over to the scene. "Thanks," one of them told the troopers. "A guy like that killed one of our local boys and injured his girl a few nights ago."

One night when TS West pulled another cuckoo off the road, a station wagon filled with people drove up. "Gosh, we're glad you got him," said the driver. "He nearly got us—and he sure would have hit somebody."



Copyrighted material

## ADJUSTABLE MITER BOX & CORNER CLAMP

**No. 44—COMBINATION MITER BOX AND CORNER CLAMP**

**Holds the wood and holds your saw.** Uses any handsaw for accurate cuts from 0° to 180°. Full 3" capacity. Sides of joints exposed for nailing, gluing. **$2.75 PPD.**

**No. 33** Works the same as No. 44, but without saw guide attachment. **$1.75 ppd.**

## SAW SHARPENING IS EASY

Super Filer No. 11 joints and sharpens hand and circular saws 6" to 10" with all teeth correct in height, depth, pitch, bevel. When file hits steel roller, teeth are finished. Saw runs true with no side pull. Includes 8" file. **$9.95 PPD.**

**"TRU-CIRCLE"** saw set automatically sets teeth at 10° or more. **$2.95 PPD.**

**Super Drill Grinder** Sharpens round shank drills like new, using hand or power grinders. **$2.95 PPD.**

**MONEY BACK GUARANTEE**

**A. D. McBURNEY, 5908 Hollywood Blvd., Hollywood 28, Cal., Dept. S-31**

## LOW COST GAS ENGINE PUMP

### *Big 5600 GPH Pump*

Brand new heavy duty gas engine pump sold direct factory-to-you at big saving. Big 2¼ H. P Briggs & Stratton engine. 5600 GPH. Heads to 50 ft. Self priming. 1½" threaded intake and discharge Portable—weighs only 39 lbs. Positive water-tight seal will not leak. Pump absolutely guaranteed two full years. Factory price only $87.25 complete as shown — delivered anywhere in U. S. Take 5% discount for cash. Rated firms shipped open account. Send $25 down for C.O.D.

**AMERICAN MACHINE & TOOL COMPANY • Royersford 79, Pa.**

## KRYLON®

**You have a use for SPRAY PAINT**

No Muss! No Brush! No Fuss!

**IF YOU PRIZE IT...KRYLON-IZE IT!**

## GEARS

**In Stock—Immediate Delivery**

Gears, speed reducers, sprockets, thrust bearings, flexible couplings, pulleys, etc. A complete line is carried in our Chicago stock. Can also quote on special gears of any kind. Send us your blueprints and inquiries.

***Send for Complete Catalog No. 220***

**CHICAGO GEAR WORKS**

440-450 N. Oakley Blvd. Chicago 12, Ill.

## EMERSON ELECTRIC

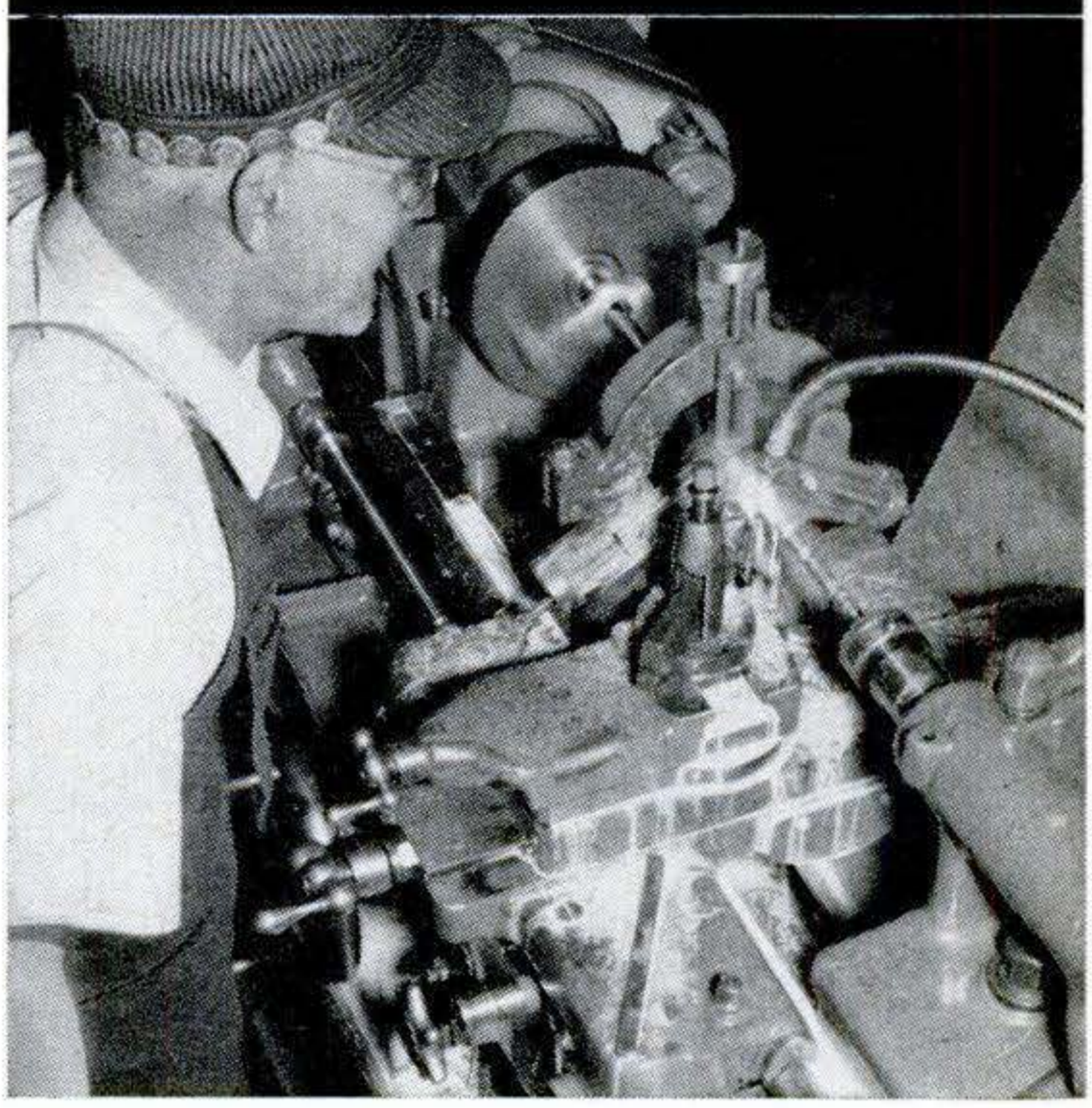
### PORTABLE WELDER

**High Capacity . . . Low Price**

Ideal for farm, home workshop. Cuts, brazes, solders, welds. One man can carry . . . only 68 lbs. 6 welding heats up to 180 amps . . . 3/32" to 3/16" rod sizes. Write today for prices and receive *FREE* WELDING SELECTOR GUIDE . . . gives working data you need in seconds! Dept. W-5

**EMERSON ELECTRIC** *of St. Louis*
8100 Florissant • St. Louis 36, Mo.

# Built to Last



# South Bend

## 13" and 14½" Lathes

Years mean nothing to these precision lathes, as they go on and on turning out accurate work at low cost with . . .

- Microfinished bearings with no metal-to-metal contact.
- Belt drive to spindle for vibration-free operation—no gear marks.
- Precision-cut gears and ground shafts for smooth power feeds.
- Rugged, rigid construction that will stand up under hard usage.
- Exacting workmanship by skilled craftsmen.

| SPECIFICATIONS | 13" | 14½" |
|---|---|---|
| Swing over cross slide | 7¾" | 8¾" |
| Maximum collet capacity | 1 1/16" | 1 1/16" |
| Spindle speed range | 20-940 | 15-875 |
| Shipping weight, 7' bed | 1760 lbs. | 2089 lbs. |
| Base price | $1759 | $2178 |

*Write for FREE 80-page catalog.*

Up to 36 months to pay.

**SOUTH BEND LATHE**
**SOUTH BEND 22, INDIANA**
*Building Better Tools Since 1906*



Copyrighted material

## Giant Kettle Brews Fresh Water

[Continued from page 68]

around 90 and has flashed its last. It is also twice as salty as it was when it began its journey through the evaporators.

***Journey's end.*** You might suppose that all this super-salty water would be dumped. Instead, to make the most efficient use of heat, some will be mixed with incoming sea water and recirculated. The rest will be discharged into the ocean at a point on the shore line 350 feet south of the intake. The prevailing current flows southward there.

Pure water from the evaporator troughs will be aerated and pumped to a nearby storage tank. San Diego will draw on that tank through a 3½-mile pipeline and probably mix the purified salt water with its normal supply.

Fluor's engineers predict that the Pt. Loma plant will produce 10-11 pounds of fresh water for a pound of steam. They are convinced that the multistage flash-evaporation process makes the most efficient use of heat in converting sea water to fresh. Furthermore, it can be easily expanded to very large size, which is not true of many other conversion processes. This last point is important: The bigger the conversion plant, the lower the cost of its product, they say.

***Turning on the heat.*** Fluor's studies have shown them that using a nuclear reactor to produce low-pressure steam for their favorite conversion process will become the most economical heating method when the plant is big enough to produce 50 million gallons of fresh water per day. And as plant capacity rises above that level, the cost of nuclear heat goes down rapidly, the engineers report.

In making cost studies for a multistage flash-evaporation plant that would turn out 130 million gallons of pure water daily, they estimated that to produce its steam by natural-gas heat would consume six percent of all the natural gas now burned in southern California. This drastic demand would so disrupt the fossil-fuel market there that nuclear heat is the only feasible substitute. Its importance to big-volume production of fresh water from the sea becomes even clearer when one learns that 130 million gallons per day is only seven percent of the water southern California now uses.

However bright the potentialities of the



CONTINUED

Copyrighted material

# Painting?

## DO A BETTER JOB FASTER

### Prepare surfaces with Wil-Bond

This unique liquid, applied with a rag, removes all dirt and grease. Also dulls glossy, varnished or enamelled surfaces. Paint or enamel goes on smoothly and bonds tightly —no unsightly streaks.

At paint and hardware stores.

**Send 25¢ for illustrated Refinishing Manual**

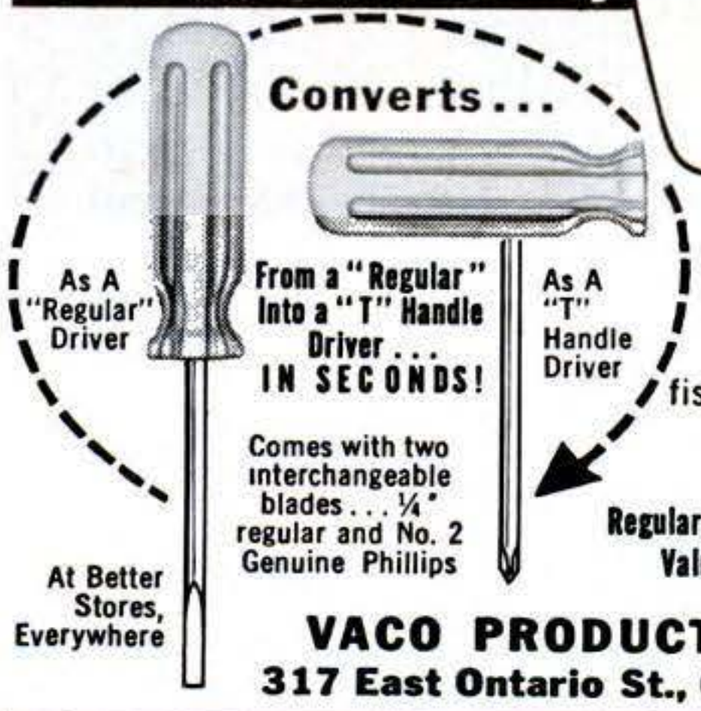
Write for free Wil-Bond folder

Wilson-Imperial Co., 121 Chestnut St., Newark 5, N. J.

# WIL-BOND

---

## New "SIDE ARM" Screw Driver by VACO®




**FREE BONUS INCLUDED:**

a new "Handi-Angler" fishing kit (bobber, fish line, sinker and hook) FREE with complete set

Regular $4.00 Value — Only **$2.98**

**VACO PRODUCTS COMPANY**

**317 East Ontario St., Chicago 11, Illinois**

---

## WALKIE TALKIE RADIO SENDING SET

**YOUR OWN POCKET SIZE RADIO STATION**

**Talk to any house or car radio without hookups of any kind!** Built-in antenna. "Break-in" on regular radio broadcasts with "Dial Setter" and "Push-to-Talk" switch. Self-contained flashlight batteries—**Power transistor! Talk to radios in the same building and to cars or between cars** up to one block or more away—depending on local conditions. **No license or permit needed!** Practical and real fun in a million ways. **Guaranteed to work —1 year service guaranteed.**

**SEND ONLY $3.00**—(cash, ck, mo) and pay postman only $9.95 plus COD postage or send $12.99 for postpd. delivery. Shipped complete ready to operate with instructions. New 1961 Model Radio Talkie is now **Super-powered!** Order yours now—Today! Available **only** from:

**WESTERN RADIO, Dept. TPS-3, Kearney, Nebr.**

---

## BOAT TRAILER KIT Only $59.50

**760 POUND CAPACITY—FOR BOATS TO 15 FT.**
**OTHER MODELS FOR ALL SIZE BOATS!**

You can really save on these rugged, perfectly engineered Kits. Guaranteed highest quality parts ready to assemble into a boat trailer with more features and better performance than high priced trailers.

**Camping and Utility Trailer Kits also available at tremendous savings! Write for 1961 illustrated catalog showing all models and prices. Please enclose 10¢ for postage and handling.**

**TRAILER PRODUCTS CO., INC.**
**Dept.PS-3,P.O.Box176,Kingsport,Tenn.**

---

THE ORIGINAL PACKAGED

# KITS BOAT

CREDIT TERMS

● World's Largest Line—New Fiberglass Hulls. Over 200 styles Boats-Kits, Formed-Hulls, Semi & Custom finished. All types: Prams, Cruisers, Racers, Inboards, Outboards. Easy to build. Professional results. **Dealers - Agents Inquire.**

**Send 35¢ for Colored Catalog**

52 pg. Kit Catalog plus 20 pg. Hardware and 8 pg. Armor Glass books. (*SPECIAL OFFER!*) Colored CATALOG plus "Boating Handbook"...all for $1.

**BOAT PLANS PATTERNS FRAME PACS**

● Over 400 Plans-Patterns, Frame Pak Kits. Prams, Kayaks, Racers, Runabouts, Catamarans, Cruisers-In-Outboards (6' to 40') Wood, Plywood and Steel. ***Send 35¢ for 120 pg. Plan Catalog.*** Catalog plus "Boat Building Handbook"... Send $1.00.

**CUSTOM • CRAFT** Buffalo 7, N. Y.

---

## Using too much gas?

## Time to add GUMOUT..

## and SAVE!

Here's a quick and easy way to fix many of the most common engine troubles. Troubles such as stalling, bucking, high gas consumption, hard starting.

Simply add GUMOUT to your gas tank and clean your carburetor while you drive. It's the best known, most reliable carburetor cleaner in America! Your car needs it.

Sold at most Service Stations, and Auto Supply Stores.

**GUMOUT** Cleveland 4, Ohio



Copyrighted material

# FIBERGLASS or PLYWOOD

50 Models 8-22 Ft.

FACTORY-DIRECT PRICES

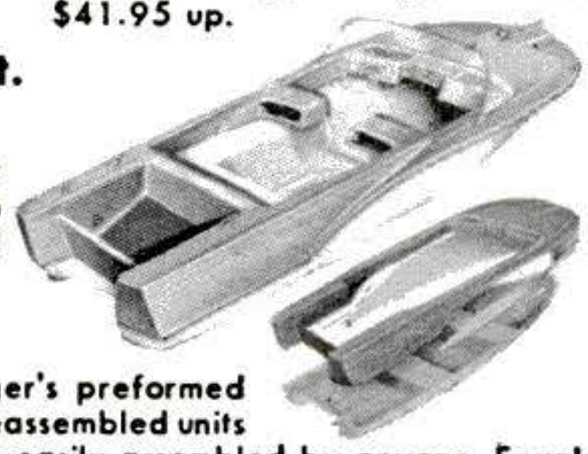
FREE CATALOG, WRITE TODAY

**18 FT. CRUISERS, 8 Models: from $369**

12, 14, 16, 18 ft. runabouts, ski-models, convertibles, utilities: $104 up. 8, 10, 12, 14, 16, 18 ft. racing, fishing, utilities: $41.95 up.

**FIBERGLASS 14 & 16 ft.**
**From $299 (at right)**

Interlocking units (lower right photo) snap together, bond into 1-piece boat easily assembled in one evening.



FIBERGLASS
14 ft. Sail Boat
$199 with sail

Luger's preformed preassembled units are easily assembled by anyone. Equal factory-built yet save ½ to ⅔. FREE catalog has all details, trailers, accessories, paint, Fiberglass supplies.

**MONEY-BACK GUARANTEE**
**EASY TERMS ¼ DOWN**

SEND FOR FREE COLOR CATALOG

# LUGER BOAT KITS

Dept. A-3 9200 Access Rd., Minneapolis 20, Minn.

***your spirited companion!***

# BSA MOTORCYCLES

***The most popular motorcycle in the world***

Team up with the championship features that make BSA the world's highest popularity choice and give it highest resale value. You'll ride the most responsive motor-sports mount—fast, dependable, and easy to handle—when you choose a new 1961 BSA motorcycle!

***Write to the nearest address for a colorfully illustrated free catalog of the new BSA models.***

Catalog offer limited to U. S. residents only.

West:
**HAP ALZINA**
Dept. PS
3074 Broadway
Oakland, Calif.

East:
**BSA INCORPORATED**
Dept. PS
639 Passaic Ave.
Nutley, N. J.


***Giant Kettle Brews Fresh Water***

sea-water conversion plant at Pt. Loma, the U. S. Office of Saline Water is not depending on it alone to solve the water problems of future Americans.

***And more to come.*** There are four other demonstration plants in the works. Each will utilize a different process, all of them promising.

One being built at Freeport, Tex., on the Gulf of Mexico, will turn sea water to fresh by a means somewhat similar to that used at Pt. Loma. It is called the long-tube-vertical, multiple-effect distillation process. The Freeport plant will also produce 1,000,000 gallons of fresh water per day. In addition, a Dow Chemical facility next door plans to extract magnesium from the residual brine.

Multiple-effect distillation, though not of the long-tube-vertical type, is already proving its merits in the largest commercial water-converting plant in the world. It is on the once-parched little island of Aruba. Every day, it extracts 2,700,000 gallons of fresh water from the Caribbean Sea, plenty for the island's 55,000 inhabitants.

In inland regions that lie over natural reservoirs of brackish water, less briny than the sea but undrinkable, other desalting processes will be tested.

***Straining out salt.*** At Webster, S. D., there's to be a 250,000-gallon-per-day conversion plant that uses electrical energy to move salt through membranes and separate it from water. This process already supplies the town of Coalinga, Calif., with all its drinking water [PS, Aug. '59].

At Roswell, N. M., another region of brackish water, a fourth demonstration plant will produce 250,000 gallons daily of pure water by means of a vapor-compression process.

A fifth method of attacking the problem is a freezing process, by means of which pure ice crystals are formed by congealing brine. As yet, the plant site and capacity have not been announced.

Of course, scientists have long yearned to use the free heat of the sun to distill sea water. This works pretty well in small installations. It becomes utterly unfeasible for big ones. A solar still large enough to produce as much water as southern Californians now consume each day would cover 400 square miles.



Copyrighted material

## start a big profit business with a small investment

## EARN UP TO $200 a DAY

*Manufacturing Exciting New*

# RAINBOW ROCK

### Concrete Slump Brick in your back yard

Earn big building boom profits with Rainbow Rock, the colorful new building brick that's taking the country by storm. Sell all you can make to contractors, builders, building supply houses. **RAINBOW ROCK CUTS LABOR COSTS BY 1/3!** Amazing low cost machine makes modern slump brick 24" long (3 times the length of ordinary brick) in a variety of widths and pastel colors . . . up to 500 sq. ft. of bricks a day! **NEEDS NO SPECIAL SKILL.** Operates indoors or out. Full instructions and valuable mixing formulae supplied. **YOU CAN START EARNING BIG MONEY NOW. PAY AS YOU PROFIT!** Machines sold only on exclusive franchise on easy payment terms. General machines sold to U.S. Govt. NOW is the time to start. Write today for free literature and full information.

**GENERAL ENGINES CO., INC.**
Dept. SR-31, Route 130.
Thorofare, N. J. - Tildon 5-5401

**STEEL PIER SENSATION**
*Luxurious RAINBOW ROCK fireplace wall in living room of the "Home of the Century" in Atlantic City, N. J.'s Steel Pier . . . acclaimed by over 500,000 Summer, 1957 visitors as the most beautiful they'd ever seen! Endorsed by the Pier's famous architect, William F. B. Koelle.*

*Makes beautiful, decorative fences, garden walls, garages, outside walls, room separators, etc.*

Dealer inquiries invited.



# GUNK® *removes grease like no detergent can!*

Clean power mowers, engines, garage floors, kitchen walls and exhaust ducts, paint brushes, furnace filters, grills or ovens, GUNK chemically changes grease into soap; rinses completely away with water. In handy aerosol or pour-spout cans at auto supply, farm, or hardware stores **everywhere!**

**GUNK CHICAGO CO., River Forest, Ill.**
*serving the Midwest and Southwest*
**RADIATOR SPECIALTY CO., Charlotte, N.C.**
*serving the East, Southeast and far West*



# *New* KING MIDGET FOR 1961

WORLD'S MOST EXCITING LOWEST PRICED CAR

Rider Agents Wanted. Send 25c for 32 page picture book, full details, dealer price. Or send $1 (refunded first order) for this plus Service and Repair Manual and 16 5x7 photos of car and factory.

**MIDGET MOTORS CORPORATION, Athens 2, O.**



# ELECTRIC WELD - BRAZE & CUT

**REPAIR MOST EVERYTHING MADE OF METAL**

Home appliances, Auto parts, Farm-garden equipment, toys. Make and repair playground equipment, lawn chairs, tables, ornamental iron work, gates, wagons, etc. Solder, heat, bend, and straighten, with terrific heat from arc torch. Cut and weld up to 1/4" steel plate. A million uses for Home, auto, farm, inventors, factories, etc. Works from any home 110 volt plug-in. Complete with dark welder's mask, arc torch, supply of carbon welding and brazing rods and complete Welding Instruction Book. 1 year guarantee.

**Send only $3.00** (cash, ck, mo) and pay postman $11.95 plus COD postage on arrival or send $14.95 and we will send postpaid. Ideal gift. Order now for early delivery. Available only from:
**MIDWAY WELDER** Dept. DPS-3 Kearney, Nebraska



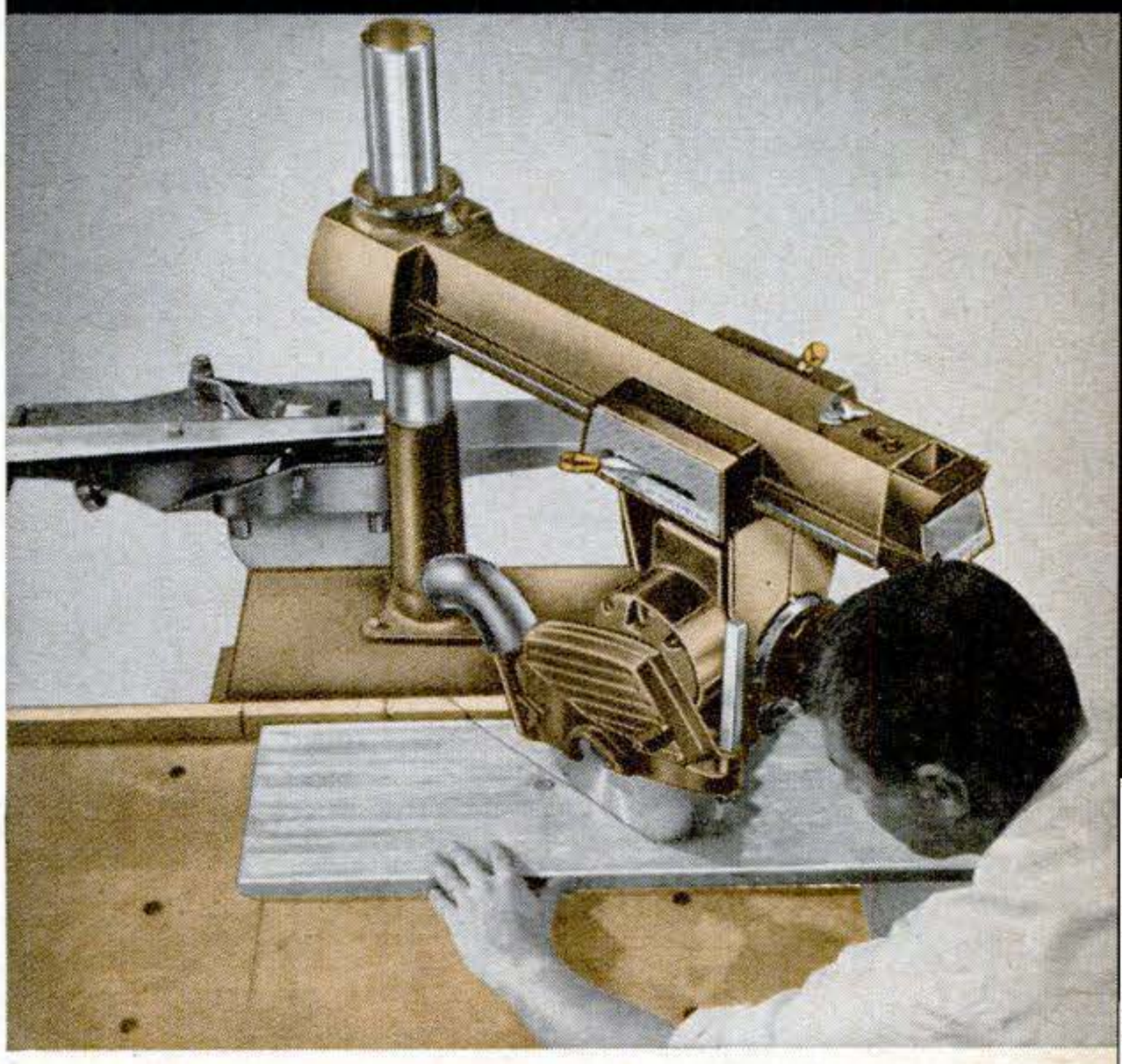


# YUBA SAWSMITH

*. . . the Complete Home Work Shop with exclusive*

# ADD-A-TOOL!

Most versatile of all radial arm saws, SAWSMITH swivels and tilts for *any* cut . . . flips from one operation to the next with a twist of the wrist . . . performs 14 basic woodworking operations with dial-controlled speed. Only **$239.00**



Now with optional ADD-A-TOOLS: Jointer, Bandsaw, Belt Sander, Paint Sprayer-Compressor, SAWSMITH performs every conceivable operation . . . from a single motor, a single stand!

## ACCESSORY SALE

## Up to $45.00 Bonus Value

Choose any 5 Bonus SAWSMITH Accessories for 1 penny each or select a $39.95 cabinet storage base for only 5 pennies when you buy a SAWSMITH. Limited time offer!

For more details write Dept. RPS-361

**YUBA POWER PRODUCTS, INC.**
800 EVANS ST., CINCINNATI 4, OHIO

A Subsidiary of YUBA CONSOLIDATED INDUSTRIES, INC.


Copyrighted material

MODERNIZE THE FINISH
ON OLD FURNITURE WITH
**Dexall**
TRADEMARK
**WOOD BLEACH**

- works fast and easy with no sanding
- will not raise the grain
- use on woodwork, furniture, floors
- nonflammable

RENEW
PAINT-HARDENED BRUSHES WITH
**Dexall**
**BRUSH CLEANER**

- cleans all types of bristles
- no work! Just let brushes soak
- makes old brushes like new
- nonflammable

**At paint and hardware stores everywhere**

**Dexall** • Deshler Products, Inc., Deshler, Ohio

### 10,000 Miles in a Lancer

[Continued from page 82]

engine make sense only for people with a compulsive need for jazzy performance. But it *is* a very eager darter-through-traffic, a storming passer.

Allaway: What you get for your gas money is very flashy performance—spine-stiffening acceleration, and extremely aggressive passing ability, even without kicking the transmission down.

Rowsome: The 3.9 axle handicaps the top speed.

Mann: Yes, it gets shrill around 70 m.p.h. That's not sufficient for turnpike driving. You should have something in reserve.

Markovich: Seventy? I got 85.

Fermoyle: Only 85? The top speed of the car was a true 87 miles an hour. We clocked it on the Daytona Speedway with three aboard.

Rowsome: After 4,000 miles more to loosen up, she made about 92 true.

### Design and Construction

Lees: The transmission's initial engagement, in either forward or reverse, is a convulsive clunk.

Allaway: I found that the rear roof overhang served as an airfoil that swirled muck over the back window. When the going was messy, it smeared over quickly.

Rowsome: The body seemed a little bit limber. It racks slightly when you tackle rough, cow-pasture roads. And door slams cause the long, ribbed top to bulge and tremble.

Lees: I couldn't figure out the purpose of two parking brakes.

Rowsome: That screwy park lock didn't seem to work, at least under roll-back loads. The pedal-type parking brake was fine, though it released with a crash.

Mann: I've been waiting for Markovich to get in his say about the transmission. For me, in getting away from a light it grabbed so abruptly that you could snap your passengers' vertebrae. Furthermore, the transmission had all sorts of impolite noises as it marched up through the gears. And it wouldn't upshift when cold. Alex?

Markovich: I guess it just fell to me to be driving the Lancer when the transmission finally went kaput. The car lurched and bucked in first gear, although it seemed okay in second and third. But



CONTINUED

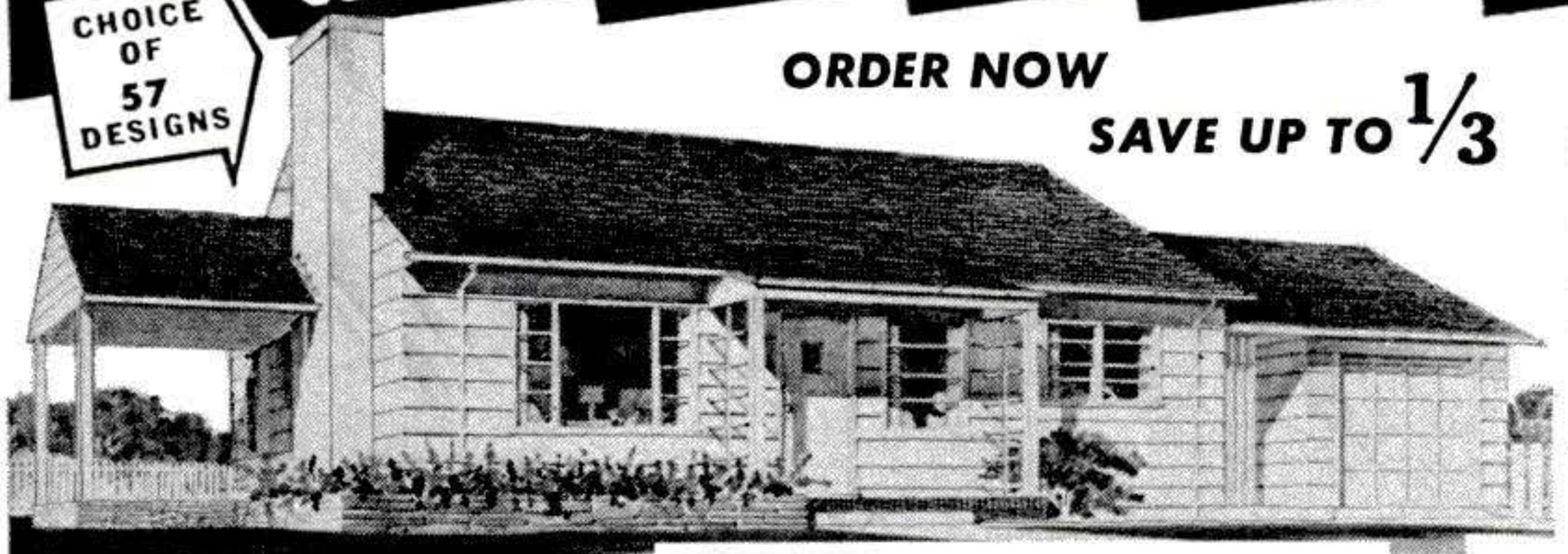
Copyrighted material

# CUT-TO-FIT HOMES CUT BUILDING COSTS

CHOICE OF 57 DESIGNS

**ORDER NOW**

**SAVE UP TO 1/3**



Build your own home and save the builders' profit — plus savings in lumber and labor with Sterling Ready-Cut-Homes. Anyone can assemble with simple, easy to follow plans furnished. Every house complete with all lumber, roofing, nails, glass, hardware, paint, doors and windows marked ready to erect. Freight paid. Complete building plans ready for filing at low cost. Sold separately if desired. Write today!

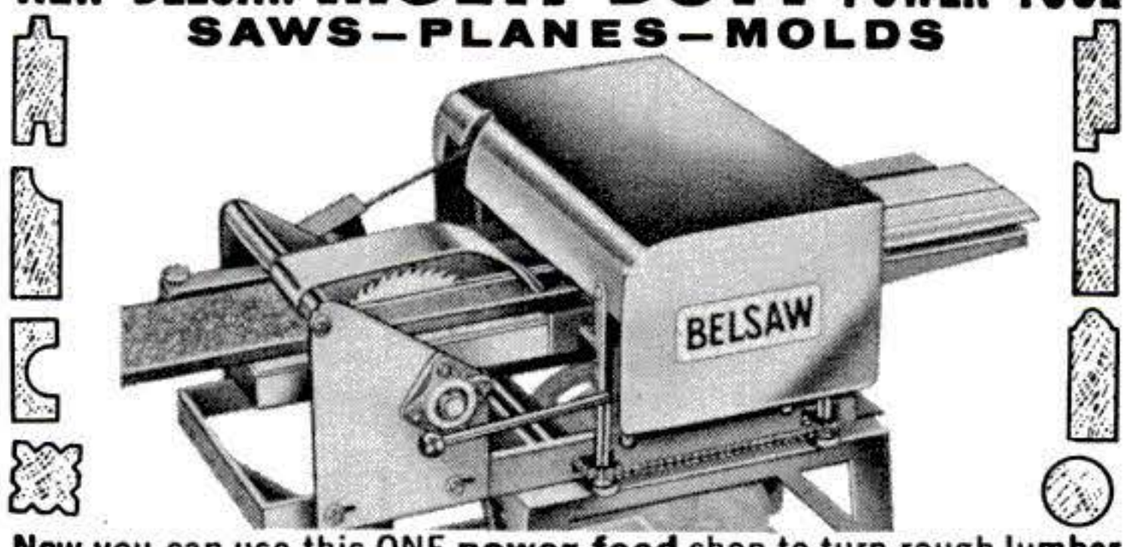
**PRICED FROM $2295 UP**
**Five Easy Payment Plans**
**Send 25c for *NEW* COLOR CATALOG**

**INTERNATIONAL MILL AND TIMBER CO.**
**DEPT. PS-31 BAY CITY, MICHIGAN**

---

# NEW BELSAW MULTI-DUTY POWER TOOL

**SAWS—PLANES—MOLDS**




**Now you can use this ONE power-feed shop to turn rough lumber into moldings, trim, flooring, furniture . . . ALL popular patterns. RIP . . . PLANE . . . MOLD . . . separately or all at once with a one HP motor. Use 3 to 5 HP for high speed output. Low Cost . . . You can own this power tool for only $30.00 down payment.**

***Send postcard today for complete facts.***

**BELSAW POWER TOOLS,** 921 Field Bldg., Kansas City 11, Missouri

---

# CRAFTSMEN—GET NEW 132 PAGE CATALOG

# WOOD

**and Workshop Supplies, Equipment**

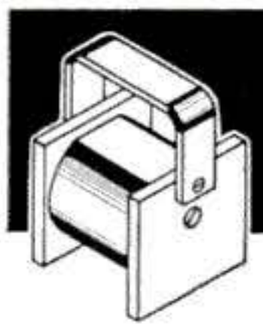
***World's Largest Selection, Rare, Fancy & Imported Woods, Mosaic Tile, Lamp and Upholstery Supplies, Tools & Hardware! ALL AT MONEY SAVING PRICES! . . .***

Send for this complete new wood buying guide and project book. Craftsman is your best, most complete source of finest kiln-dried domestic and rare imported woods, beautiful wood inlays, colorful bandings, matched plywoods, embossed mouldings, carved ornaments, newest woodworking tools, "hard to find" cabinet hardware and fittings . . . more than 1,500 items! Packed with new patterns, project ideas and money making plans. Enclose 25c (refunded with first order) to help pay mailing and handling cost. Write:

**NOW—Stanley Power Tools at Discount Prices!**

**CRAFTSMAN WOOD SERVICE CO., Dept. B-3**
**2729 South Mary St., Chicago 8, Ill.**

---



# MAGNETS

| | | |
|---|---|---|
| | TSX-15 Magnet Assembly (150 lb. pull) Each.... | $9.50 |
| | TS-1 Magnet Assembly (50 lb. pull) Each..... | 2.95 |
| TSX-15 | TS-2 Alnico 5 Pot Holder Magnets 50 for $3.50, 20 for | 1.50 |
| | TS-4 Pencil Magnet with clip, 29c each, 4 for..... | 1.00 |
| TS-5A | Rectangular U's (4 lb. pull) 10 Magnets..... | 3.25 |
| TS-6 | Sample Magnets & Catalog (over 200 sizes listed)..... | 25c |

***Money Back Guarantee***—Send check or money order, sorry, no C.O.D.'s

**TERRY SALES CORP., 1045 Silver Beach Rd., Riviera Beach, Fla.**

---

# PAGE *FOR* TILLING PLOWING MOWING

**A FULL LINE — 2 to 9 HP**
**with complete gear drive and reverse**
**FREE CATALOG • LOW PRICES • EASY TERMS**
**Over 40 years experience**
***OVER 60 ATTACHMENTS AVAILABLE!***

**PAGE** Richfield 16 Wisconsin

DEALERS WANTED

---

**WELD** **BRAZE** **SOLDER** **CUT**

**4 WAY WELDER**

**ONLY $14.75 f.o.b. factory**

Complete with Twin Carbon Arc Torch and accessories . . . to handle all metal-craft work.

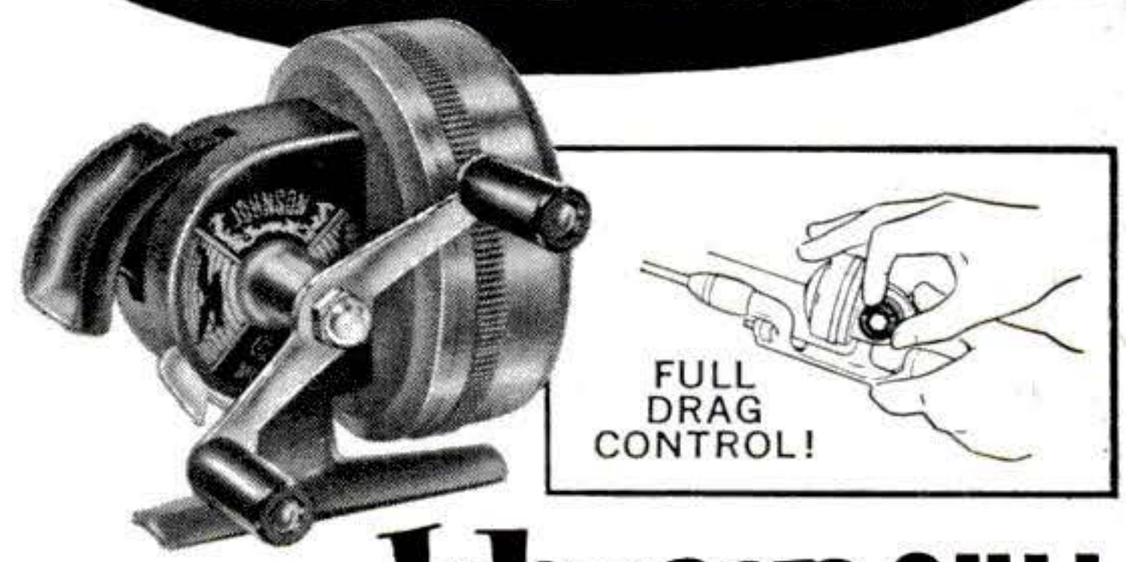
Acclaimed by thousands of Homeowners, Mechanics and Hobbyists as the welder of 1001 uses. Easily operated from properly wired 110 volt AC or DC line. The ideal gift with a life-long use. Order today on 10 day money back guarantee. Send only $3.00 today. Pay Postman balance C.O.D. plus charges. Literature on larger equipment on request.

**FOUR-WAY WELDER CO., Dept. F3-C**
**1810 S. Federal St. • Chicago 16, Ill.**

---

*THIS NEW FISHING REEL*

# THUMBS ITSELF!




# Johnson GULL

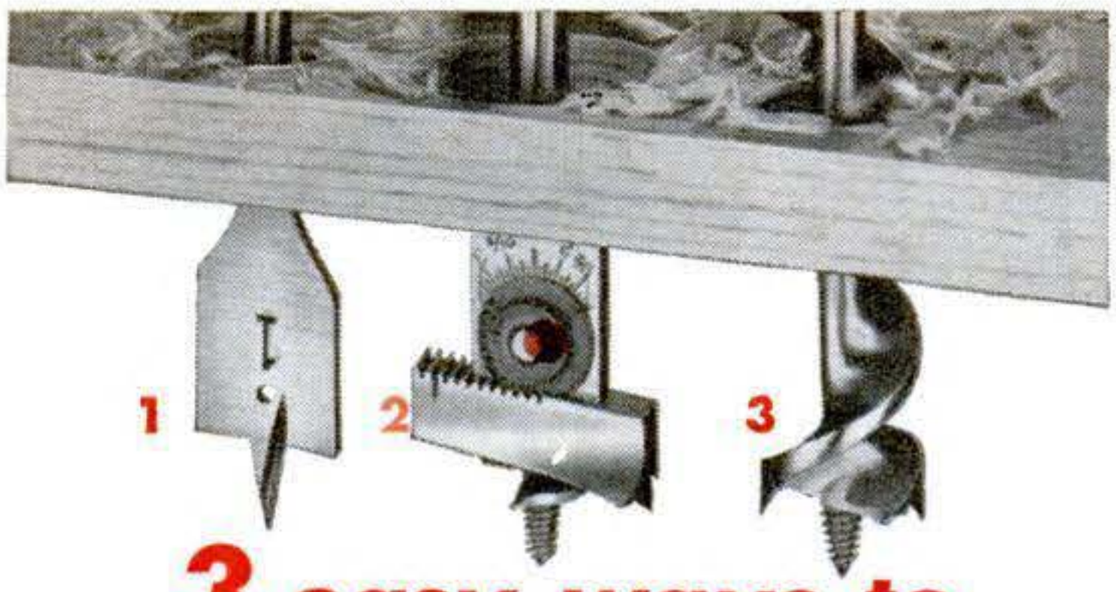
## *CLOSED-FACE CASTING REEL*

Johnson GULL can't backlash, can't run over because it "thumbs" itself. Yet the GULL gives you all the advantages of direct-power bait casting plus powerful, adjustable drag; push-button control; drag click; compact, one-piece case. And you get *two* spools with your Johnson GULL, one loaded with 8-, the other with 12-lb. test monofilament.

See it at your dealer's. Own the Johnson GULL and you own the newest in fishing.

**JOHNSON REELS, INC.**
**253 Johnson Park • Mankato, Minn.**

Copyrighted material




# 3 easy ways to bore holes faster

**1. Irwin Speedbor "88"** for all electric drills. Bores up to 5 times faster in any wood, at any angle. Sizes 1/4" to 1", $.75 each. Sizes 1 1/8" to 1 1/2", $1.25 each.

**2. Irwin No. 22 Micro-Dial** expansive bit. Fits all hand braces. Just dial your size. Bores 35 standard holes, 7/8" to 3". Only $4.00. No. 21 small size bores 19 standard holes, 5/8" to 1 3/4". Only $3.60.

**3. Irwin 62T Solid Center** hand brace type. Only 16 turns to bore 1" holes through 1" wood. Double-cutter boring action. Sizes 1/4" to 1 1/2". As low as $1.05 each.

**EVERY IRWIN BIT** made of high analysis tool steel, heat tempered, machine sharpened and highly polished, too. Buy from your independent hardware, building supply or lumber dealer.

**Strait-Line Chalk Line Reel Box**
**only $1.25 for 50 ft. size**
**New and improved** Irwin self-chalking design. Durable aluminum alloy box. Practically damage-proof. Fits pocket or hand. 50 ft. and 100 ft. sizes.

**IRWIN** *every bit as good as the name*
at Wilmington, Ohio, since 1885

Spring balanced Bilco Doors open at a touch . . . lock securely . . . are weathertight, cost so little!
**The door used on thousands of new homes!**

**The Bilco Co., Dept.** R-103
**New Haven 5, Conn.**
Pease send me your fully illustrated folder and name of local dealer.
Name_____
Address_____
City_____
Zone____State_____

Bilco®
AMERICAS FINEST BASEMENT DOOR




reverse went out completely. I had to take it in for repair.

Rowsome: The trouble was a sticking rear servo, which burned out the bands. They fixed it under the warranty. But considering how we were belting the poor thing, I don't know that it was a meaningful failure.

## Safety and Comfort Features

Lees: Over-the-hood visibility is exceptionally good.

Fermoyle: For my taste, the leading edge of the front seat is a bit high and hard, and has a welt running across it. It gave me cramps in the leg.

Mann: I found the interior comfort excellent. The heater is magnificent.

Allaway: Anybody notice the ash tray? It's a long arm's length from the driver, and the ashes spill out the sides.

Rowsome: We figured that the guy who designed it doesn't smoke. And the tailgate crank is a mechanical I.Q. test the first time you try it.

Lees: The turn signal should be more audible. And that sharp triangle that tops the rear of the front door had me lifting my hand to protect my Adam's apple.

Markovich: I'm much less critical in this department. The instruments were well placed. I was grateful for the variable-speed electric wipers. There was plenty of luggage space. I found practically no wind noise, regardless of the window opening.

## In Conclusion

Allaway: I think we might fairly say, because of bad breaks in weather, that we gave this car the toughest run of any of the six compacts we've driven 10,000 miles and reported on. All in all, the Lancer came through fine.

Mann: It's definitely superior—as we equipped it—to the other compacts I've driven.

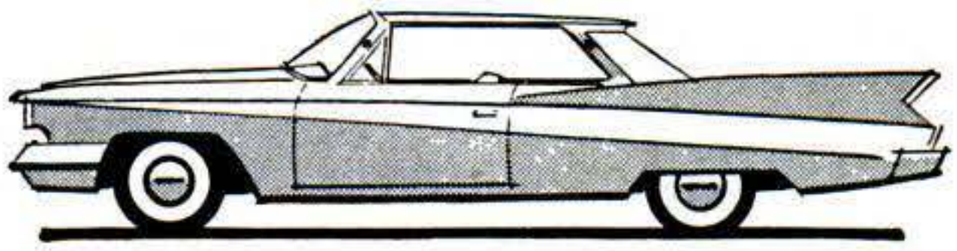
Rowsome: A very ingratiating vehicle. Anything that goes like this one is entitled to have a bum ash tray.

***NEXT MONTH: Some look like a pile of junk; others are slick as a Jag saloon. Some are for show; others will hit 200 m.p.h. For ingenious machinery, read "Cars Detroit Never Built"—a roundup of remarkable hot rods—in April PS.***

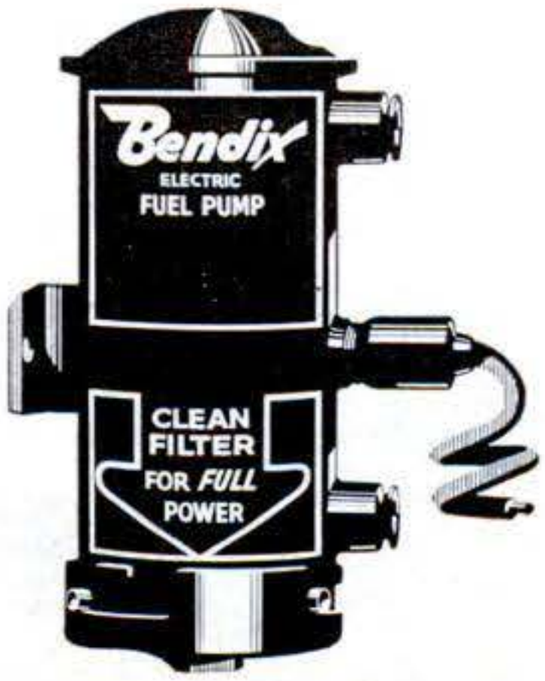


Copyrighted material

# IF YOU'RE A PERFECTIONIST ABOUT YOUR



# THEN YOU SHOULD HAVE A




Here's the all-weather answer to starting problems. Performance-proved at 150°F. *above* and 65°F. *below* zero, the Bendix® Electric Fuel Pump gives instant hot-weather restarts, instant cold-weather starts. It prevents vapor lock, provides longest operating life. To start better—to go better—make it *Bendix*. See your dealer.

A NEW BENDIX LOW-PRESSURE PUMP (1¼ TO 1¾ PSI) IS SPECIFICALLY DESIGNED FOR SMALL CARS AND OTHER SMALL ENGINES.

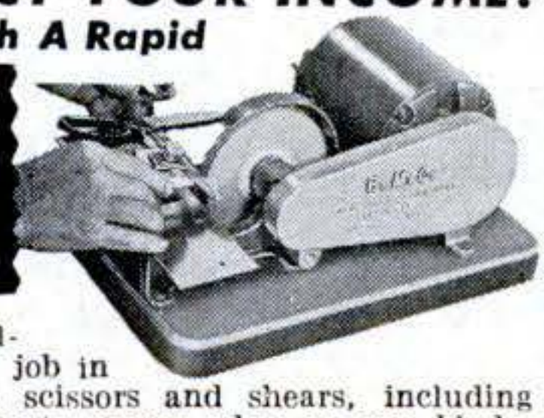
Bendix-Elmira
ECLIPSE MACHINE DIVISION
ELMIRA, N.Y.

THE Bendix CORPORATION

---

**HOW TO PROTECT YOUR INCOME!**
***Earn Extra Money With A Rapid***

## SHEAR SHARPENER AND KNIFE SERRATOR



**Easy to operate** — professional-type sharpener does a perfect job in just 2 minutes on all types scissors and shears, including pinking shears. Knife guide puts proper edge on any blade. Knife serrating attachment puts saw-tooth edge on hard or soft steel blades. Quick profits from homes, dressmakers, barbers, restaurants, hotels, butchers, etc. No experience needed. Big opportunities with this precision ball bearing machine. Has ¼ h.p. motor. A money-making investment—write for **FREE FOLDER PS-12.**

**BEAVER MFG. CO.** P.O. Box 434, 800 So. Isis Ave., Inglewood, Calif.

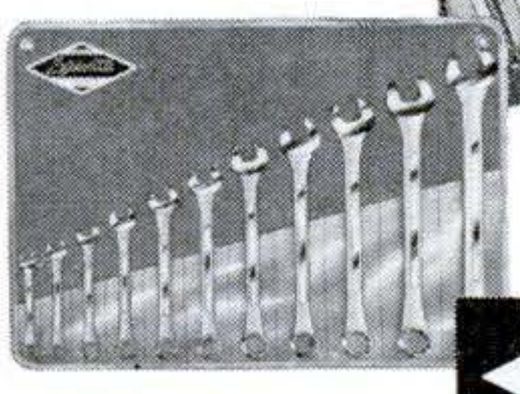
---

**Men who know GLAZIERS' TOOLS say the BEST are Red Devil Tools.**

---

## CHOICE OF PROFESSIONAL MECHANICS

SK/Lectrolite tools are preferred by men who make their living with tools



A tool for every need . . . with quality you can actually feel.

A COMPLETE SELECTION OF SOCKETS, HANDLES AND WRENCHES

S·K Lectrolite TOOLS

CHICAGO 32, ILLINOIS / DEFIANCE, OHIO



Copyrighted material

# AConomize on Gasoline

Get more miles per dollar—install an AC ACon-O-Mizer between your fuel pump and carburetor. Reduces flooding and stalling . . . tailors fuel pressure—precisely and instantly—to every driving condition from idle to full throttle. The best answer yet to real gasoline economy!

suggested retail price

**$7.95**

At Your Nearby Service Station, garage or General Motors Dealer

**ACon-O-Mizer**

AC SPARK PLUG — THE ELECTRONICS DIVISION OF GENERAL MOTORS

FREE ★ BOOK

**CLOGGED SEWERS**
**REMEMBER THE COSTLY PLUMBING BILL—**

Chicago—March 1. Just introduced is a Free Booklet on machines which enable the Home Owner, Janitor or Factory Maintenance Man to Rod-it-himself—

Yet anyone can operate this new Rodding Tool which is whirled down the drain in a few seconds. SINKS, BATHTUBS, TOILETS, URINALS, FLOOR DRAINS, HOUSE TO STREET SEWERS can be cleared of Rags, Grease, Paper, Sand while Cutter blades can be added for removing roots. A new discovery in Swedish Music Wire gives the rod 100% more Flexibility.

Another new unit is the Miller Electric Rodder which has patented cutters that expand automatically to the size of the pipe. It will clean out heavy obstructions in pipe diameters 3" to 12". Smaller Sizes available. But now, what are these Tools worth in **COSTLY PLUMBING BILLS SAVED.** Tear this Ad out—and write your name and address beside it for **FREE BOOKLET** on Hand and Electric Units. Obey that urge. No Agent will call. A postcard will do (Chicago Phone Kildare 5-1702)

Attachable Cutter Blades

**Miller Sewer Rod, Dept. PR-3, 4640 N. Central Ave., Chicago 30, Ill.**

GENUINE ALNICO

# MAGNETS

**AMAZING, PERMANENT, NON-ELECTRIC. HIGHLY PRACTICAL.**
Conduct interesting experiments. Hundreds of uses. Retrieve valuable steel items such as guns, tackle from fresh or salt water; tools from tanks & drains. GUARANTEED. Try any magnet one week. Money back if you are not well-pleased.

No. S-710 (Wt. 53 oz.) Has pull of 225 lbs. on steel block. . $18.00
No. S-625 (Wt. 70 oz.) Has pull of 125 lbs. on steel block. . $10.00
No. S-575 (Wt. 18 oz.) Has pull of 75 lbs. on steel block. . . $ 7.00
No. S-500 (Wt. 13 oz.) Has pull of 50 lbs. on steel block. . . $ 5.00
No. S- 90 (Wt. 5 oz.) Has pull of 15 lbs. on steel block. . . . $ 3.50
No. S- 47 Hot Pad Magnets. 10 for $1.00. . . . . 50 for $ 4.87
No. S- 35 Hobbyist assortment of 8 magnets. . . . . $ 2.00

*Send M.O. or check. We pay postage. Sorry no C.O.D.'s.*

**MIAMI MAGNET COMPANY, 3240 N.W. 27th Ave., Miami 42, Fla.**

# PROFESSIONAL'S WAY to remove furniture finishes

Complete removal of old finish gives you more beautiful new finish. Here's how professionals do it: Apply Heavy-Bodied Klean-Strip Paint Remover. When old finish blisters, wash it off with steel wool dipped in warm water and detergent solution. Easy, fast, thorough! Write for free descriptive folder.

The Klean-Strip Co., Inc.,
2340 S. Lauderdale, Memphis 6, Tenn.

**Heavy-Bodied KLEAN-STRIP**


# Answers to PS Puzzlers on 18 and 20

**Sports meet.** No. If he averaged 30 m.p.h. on the first lap his rate was a half a mile a minute. It would have taken him two minutes—all his allotted time—to complete that first mile lap.

**Crosstown traffic.** It's 12 m.p.h. "Average" rate equals the total distance divided by the total time. Figure this way:

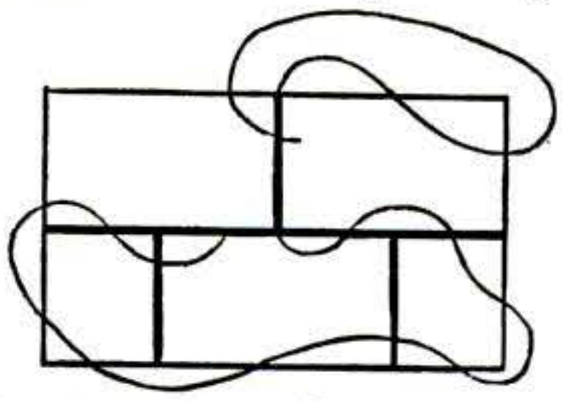
Let d = the distance from bridge to office

Then time out $= \frac{d}{10}$ and time back $= \frac{d}{15}$

The total time $= \frac{d}{10} + \frac{d}{15} = \frac{25d}{150} = \frac{d}{6}$

The total distance = 2d. Dividing 2d by d/6 gives 12 m.p.h.

**Unicursal poser.** If you stay on the line, you're not crossing it.



**Defective nails.** The number of ways you can pick 10 items out of any collection of 100 (with no replacement as you go) is simply: $100 \times 99 \times 98 \times \ldots \times 91$.

But in collections of look-alike objects like nails you don't care in what order the batches come out. In other words you'll want to consider an assortment containing nails 3, 5, 9, 15, 23, 18, 4, 10, 99, and 16 as the same as another batch which came out 15, 99, 23, 10, 4, 18, 5, 16, 3, and 9. To eliminate these duplicates you divide the original total by the number of ways of ordering 10 items: $10 \times 9 \times 8 \times \ldots \times 1$.

The good nails form a subset of the whole collection in which you have only 90 nails to choose from at the start, so your total combinations (again dividing through by the ordering factor) is:

$$\frac{90 \times 89 \times 88 \times \ldots \times 81}{10 \times 9 \times 8 \times \ldots \times 1}$$

The final probability is simply good-nail combinations over the total combinations. In making that fraction the ordering factor cancels out and you get simply:

$$\frac{90 \times 89 \times 88 \times \ldots \times 81}{100 \times 99 \times 98 \times \ldots \times 91}$$

This is approximately 0.330476. That means that the chances of getting no defectives in 10 nails are a bit less than a third.

**Counterfeit Coin:** Coins minted in the time of George I would not have borne the numeral. George "I" doesn't exist until there's a George II.

**Nines and sevens:** $99\frac{9}{9} = 100$. As for the sevens, any variation on this theme will work: $\frac{77}{.77}$. And of course they don't have to be 7s either.

**Homer's fury:** It seems the fishermen were talking about fleas, not fish.



Copyrighted material

# WAR SURPLUS AND OTHER BARGAINS SAVE UP TO 90%

**BATTERY OPERATED CAPSTAN**—Terrific power for pennies. Use for rope rigging of any type as anchor windlass on boats. Can be bumper mounted for pulling power, lifting or dragging on jeeps, tractors, trailers, trucks and campers. Will operate on 6, 8, 12, 24 or 32 V. Fully enclosed weatherproof case, 5½" dia. spool. Capacity 2500 lbs. plus. Shipping weight 66 lbs. 18" long (including spool) x 8" high x 12" wide. 3 horsepower motor with tremendous reduction. NEW. Another Airborne exclusive— **$89.95.**

**AUTOLITE DC GENERATOR** Terrific gen. for arc welding, battery charging or wherever DC power is required. Low 2275 RPM. 140-200 Amp. Approx. GOVT. COST $350. NEW, factory boxed. **$17.95.**

**R3 GENERATOR** Terrific for making arc welder. 3000 RPM. 30 V. 300 AMP output. Approx. GOVT. COST $750. Like NEW. **$29.95.**

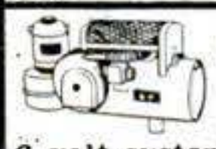
**HEAVY-DUTY CABLE**—Size No. O. Four layers insulation. Fiberglas jacket. Use as positive and negative electrode cables for arc welder. High amperage, late government spec. Approximate GOVERNMENT COST $40. 50' lengths— **$14.50.**

**DELCO DC GENERATOR** 12 V., 50 AMP. Pedestal mounting. Rugged, ball-bearing construction. ¾" shaft with key & keyway. 3600 RPM max. Shpg wt. 55 lbs. Great for boat, truck or battery charger. Approx. GOVT. COST $97. NEW, **$17.95.**

**ELECTRIC STORAGE BATTERY WINCH** Fully reversible, drum switch. Runs from car or truck battery. Lifts 2,000 lbs. plus. **$46.50**

**AIRBORNE ALL-PURPOSE ELECTRIC WINCH** Fully bearinged 3 HP motor with a reduction of 240 to 1. Will operate on 6, 8, 12, 24 or 32 V. Will lift up to 2 tons. Safety clutch set at 3 tons. Fully reversible. Adjustable hand brake and lock. Drum will handle over 500' of ¼" steel cable or ⅝" rope. A terrific, compact power takeoff for beaching boats, etc. Will work off any battery within the range from 6 to 32 V. Cost of this unit is less than an installation for a competitive brand. Shpg. Wt. 150 lbs. Complete, ready to run (less cable). Dim.: 8" W x 34" L x 18" H. NEW, **$99.50.**

**BUILD YOUR OWN ARC WELDER, LIGHT PLANT OR BATTERY CHARGER $37.50** Kit incl. 1 Navy NEA-5 Gen. combination AC-DC type. AC 115 V. DC 24 V., 200-300 Amps. 2 complete generators in 1, yet no larger than reg. gen. Ideal for home, shop and farm lighting plants. Delivers 1200 Watts AC, DC side for charging batteries, welding and operating war surplus motors. Also in kit: 2 Voltage Regs., AC & DC, Reverse Current Relay, 30' New Welding Cable, 1 Ammeter, Rheostat, Electrode Holder, Toggle Switch, Welder's Shield, Wiring Diagram for kit. Wt. under 100 lbs. Approx. GOVT. COST $650. Kit—**$37.50.** Navy NEA-5 Gen. as above, purchased separately, **$23.50.**



**SOUTH WIND HEATER & ACCESSORIES** Manufactured for govt. antarctic expeditions for jeeps and half-tracks. Heating unit puts out over 20,000 B.T.U.'s. Late recirculating type. Burns any type gas. 6 volt system. Fuel consumption extremely low, 1 gal. per 8 hrs. Terrific for trucks, etc. With service & installation manuals & many components. Approx. GOVT. COST $550. Shpg. wt. 50 lbs. gross. NEW. **$39.95.** Limited quantity. Also available in 24 volts. **$39.95.**

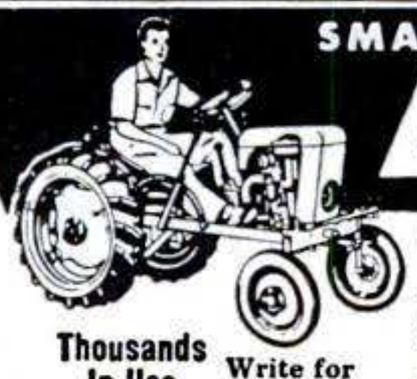
**CHRONOMETRIC TACHOMETER** Built to U.S. Navy & Air Force specs. Jaeger Watch Co. For counting revolutions per min. of any rotating shaft. Can be used on speeds up to 10,000 RPM. Accuracy to 1/10 of 1%. Complete with male & female tips & leatherette hand case. GOVT. COST $87.50. LIKE NEW. Only **$19.95** ppd.

**140-1 REDUCTION GEAR** For beaching boats, winches, hoists. Ideal motor in golf or boy's electric car. DC motor & clutch. Easily reversible wiring diagram furnished. Hi torque, 105 RPM. Runs on 6-12 or 24-32 V. 65 lbs. gross. Approx. GOVT. COST $300. **$12.00.** Matched splined gear — **$3.00** ea.
*225-1 Reduction Gear — **$13.50.**

**NEW 1961 CATALOG!** Tremendous catalog—our biggest ever—fully illustrated—1000s of bargains in war surplus & other items. Send 25c in coin for your copy today or free copy with order. Where ppd. indicated applies to US only. Other prices FOB Culver City, Cal. Send cash, check, money order. 50% dep. COD.

**AIRBORNE SALES CO., INC. DEPT. PS 361**
8501 Stellar Drive, Culver City, Calif

---



SMALL! POWERFUL!

# ECONOMY TRACTOR

**Unequalled value! Low price!**

America's finest tractor. Ruggedly built. Easy to operate. 790 lbs. Borg-Warner clutch, trans. and diff 140 to 1 reduction. 40% more drawbar pull than ordinary tractors 8-1/4 H. P. engine. 20 quick change implements. HOOD, FENDERS.

**Thousands In Use**

Write for complete details.

**Engineering Products Co.**
1005 A-3 Anoka Ave.
Waukesha, Wisconsin

---

# 10" TILT/ARBOR SAW BUILD-IT-YOURSELF

**from GIL-BILT KITS-PLANS**

Sturdy wood, steel and aluminum construction. BALL BEARING arbor. Capacity and performance of saws selling for $150 and up. Plans, all metal parts in Kit, **$23.95.** With 10" comb. blade, **$27.40.** Enclose this Ad for FREE DELIVERY. Detail PLANS-PATTERNS only **$1.00,** refundable with order.
Build-it-yourself 12" and 18" Bandsaw, 6" Belt Sander, Comb. Drill Press-Lathe, Shaper. Build easily with hand tools only. Advertised and sold for 13 years. Over 40,000 machines in use.
MONEY-BACK GUARANTEE. **FREE CATALOG.**

GILLIOM POWER TOOLS 1109 North 2nd St. Dept. PS-C. St. Charles, Mo.

---

# JEEP OWNERS

**Re-Power NOW with a V-8 or 6 Cyl engine—Use**

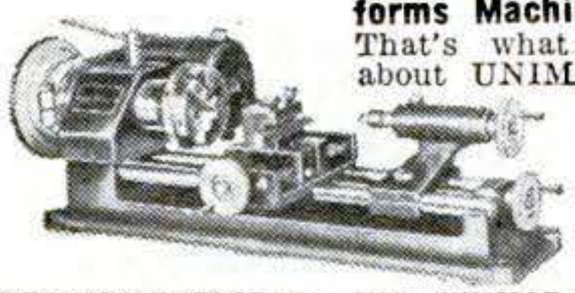
Ford - Chev - Mercury - GMC - Pont - Stude - Dodge or Plymouth in Jeeps, Jeepsters. Sta-Wgn, Trucks, Kaiser & H. J. cars. Conversion kits $45.35 to $56.90. Want fast action? Give us full information, send $15.00 Dep. and we will ship correct kit. Bal. COD. Send full amount for prepaid shipment. Wire, phone or write today. Details FREE.

**HOOSIER MACHINE PRODUCTS CO.**
314 S.E. 6th St. Phone CR6-3442 Pendleton, Oregon

---

# "MINIATURE MACHINE SHOP

**No Bigger Than A Typewriter, Outperforms Machines Many Times its Size!"**



That's what Mechanix Illustrated says about UNIMAT in their 3 page feature story in the May issue. If you want a reprint of this story plus complete information about this amazing 10 in 1 combination precision tool write to:

AMERICAN EDELSTAAL, INC., UNIMAT DIV., Dept. HC, 350 B'way, N.Y. 31

---

# Smarter Low-Cost Boating

fits in every home or car

Famous PORTABLE and FOLDING Folbots

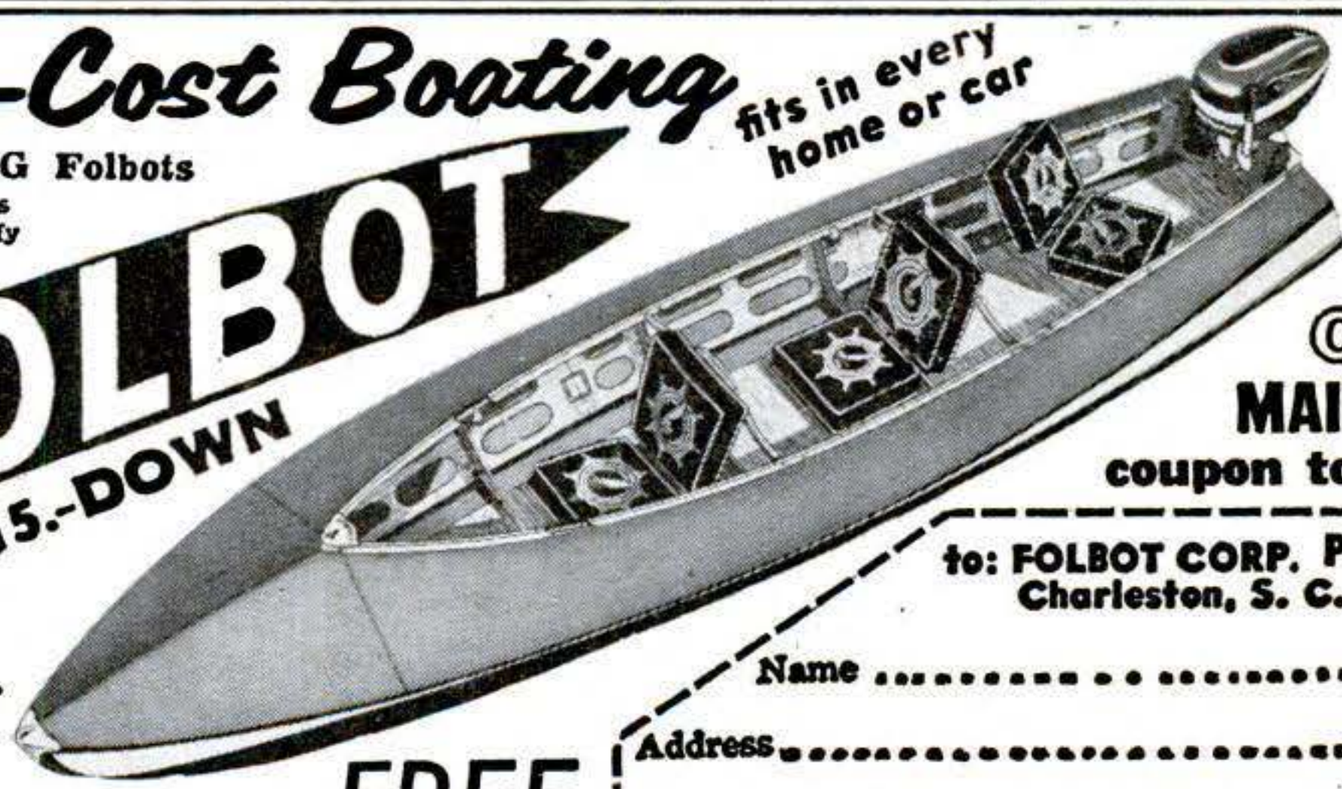
Most seaworthy, all colors and sizes, 1 to 4 seaters
Exclusive low and high seats, SWIVEL backs. Comfy
Cruising, fishing, hunting. Use motors, Sails,
Paddles. NO upkeep. Goes anywhere.
PREFAB or Factory Finished on
$15 monthly terms.

**BIG CRAFT**
NOW ONLY
**$49 up**

PREFAB SAIL RIG 89.—

# FOLBOT

ONLY 15.-DOWN start you right away.



FAST Smart SAFER

CATALOGUE FREE

© MAIL coupon to:

to: FOLBOT CORP. PS
Charleston, S. C.

Name .....
Address .....
City ..... State ....



Copyrighted material

# $500 in 4 months spare time

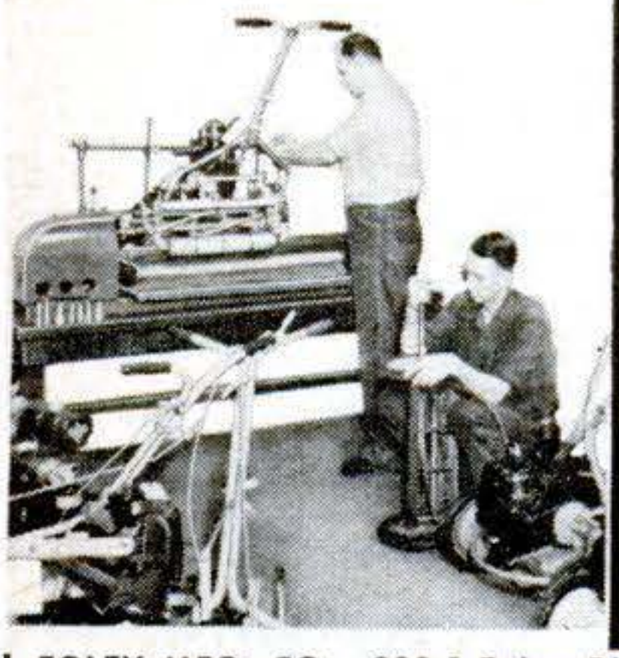
## IS WHAT I MADE WITH the FOLEY LAWN MOWER SHARPENER

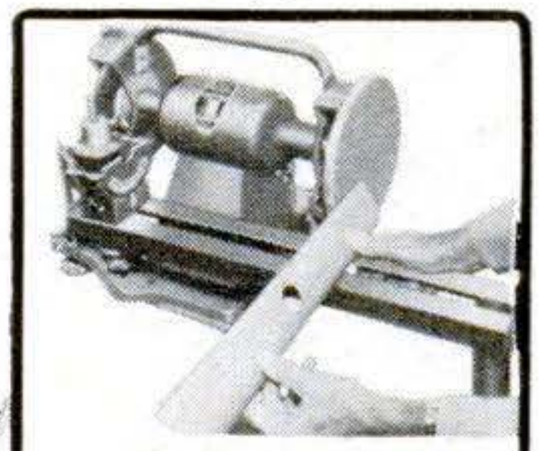
"No one can go wrong with the Foley machine"—V. J. Patterson wrote us. Get in this CASH business where 99c of every dollar is YOUR profit! The Foley Lawn Mower Sharpener handles up to 3 or 4 mowers per hour. Hand mowers run $2.00 to $3.00—power mowers $5.00 to $8.00.

FREE PLAN shows how to start. Foley prices are low—easy payments available. Send coupon today—no salesman will call.

"In my home town of 5,000 I paid for the Foley 4 or 5 times over the first season. I also put a $1035 oil furnace in my new home."—B. Mathews.

"We sharpened nearly 1000 mowers our first season and gained a reputation for the best work."—J. W. Kemper.





***Sharpen Rotary Mower Blades*** with the Foley Grinder, also circular saws, ice skates, scissors, planer knives, all sharp edged tools.

FOLEY MFG. CO., 308-1 Foley Bldg., Minneapolis 18, Minn.
Send FREE PLAN on lawn mower business and Special Combination Offer.

Name_____

Address_____

# WIN! on a TRIUMPH®

When it comes to performance, Triumph has no peer. Choice of competition riders everywhere — because of its reliability, easy handling and stamina. Triumph's '61 "Big Choice" OHV line enables you to buy the model built for your type of fun! From 4 cycle lightweights to 40 cu. in. twins.

Ask your *Triumph* dealer for a *Free* demonstration ride.

**GET FREE, FULL-COLOR, FULL-LINE 1961 TRIUMPH CATALOG**

***Mail this coupon today to nearest address.***

In the West
Johnson Motors, Inc.
267 W. Colorado St.
Pasadena 1, Calif.

In the East
The TRIUMPH Corporation,
Towson, Baltimore 4 Maryland

Please Print

Please send FREE full-color, full-line 1961 Triumph catalog to:

Name ..... Age .....

Street .....

City, Town .....

State .....

Phone ..... Dept. S

# HOW TO TURN *Concrete* INTO *Gold*

**A MUST FOR EVERYONE CONCERNED!**

This MANUAL Tells You How To Make Handsome Profits From Concrete Items YOU CAN MAKE

All you need is a mold or two and a little determination. This Manual contains large, clear pictures, gives prices and description of more than 200 different molds you can buy direct from the manufacturer, AND...priceless trade secrets that make production a snap. Take the first step Today !!!

SEND ONLY $2.00 FOR YOUR COPY
(Rushed to you by First Class Mail)

CONCRETE MACHINERY COMPANY, INC.
Dept PS Hickory, N. C.

# RESEARCH EDUCATION SERVICE

AMERICAN CANCER SOCIETY

CONFIDENCE
**BRAND NAMES**
SATISFACTION

BRAND NAMES FOUNDATION, INC.
437 FIFTH AVENUE, NEW YORK 16, N.Y.

# COLLECTION OF HISTORY

When the Patrick Henry commemorative was issued on Jan. 11th to complete the series of six **AMERICAN CREDO** stamps, a few first day covers were mailed bearing **all** 6 credo stamps on the same **combination** cover. This unusual arrangement brings together **on one envelope** the famous statements of six of America's greatest Statesmen. This cover will make a **beautiful and historical** addition to your cover collection. Even if you have no interest in stamps you will be proud to own this **very different** kind of **FIRST DAY COVER.** It will be inscribed with your own name and address or that of any of your friends and can be sent to you post paid for **only $1.00.** Your money back if not completely satisfied. Ask for our free list of other unusual covers.

**K. M. WALSH, BOX 308-C, TUCKAHOE, N. Y.**



Copyrighted material

# SURPLUS SALE

GOVT. SURPLUS
EXCESS INVENTORY
BANKRUPT STOCK

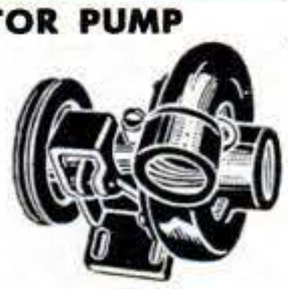
### STANDARD DIAL PHONE

● **Item #716.** Genuine W.E. modern, hi-efficiency dial phone. Use for extension to main line on private system. Use several for complete private system. Work on any system. Shipping weight 8 lbs. Cost govt. $29.50. SALE ..... **$7.95 FOB**

### AIR POWER GREASE GUNS

● **Item #1427.** Super special genuine Lincoln automatic air power grease guns. Ideal for farmers, contractors, etc. Operates off any compressor at 40 to 50 lbs. pressure. Grease tractors, cars rapidly with professional results. Takes hard work out of greasing. List $60.80. SALE ..... **$16.95 FOB**

### FARMER-CONTRACTOR PUMP



● **Item #200.** 2½" size, 16,500 gph. New ball-bearing centrifugal irrigation-contractor pump. 280 gpm 65 ft. head. 6" pulley. 2½" intake, 2" discharge. Wt. 37 lbs. Govt. cost $98. SALE ..... **$49.50 FOB**

### POWER PLANTS —GENERATORS

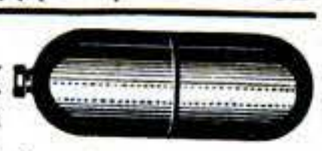
● Deluxe Govt. units 115-v. 60-c. Large selection. Typical values. Write for detailed catalog.

| | |
|---|---|
| ● 1000-watt, 115-v, 60-c plant | **$169.95** |
| ● 1500-watt, 115-v, 60-c plant | **189.95** |
| ● 2500-watt, 115-v, 60-c plant | **259.95** |
| ● 3000-watt, 115-v, 60-c plant | **249.50** |
| ● 7500-watt, 115/230-v, 60-c plant | **595.00** |
| ● 750-watt, AC generator, only | **59.70** |
| ● 2000-watt, AC generator, only | **119.50** |
| ● 5000-watt, AC generator, only | **209.25** |
| ● 12,500-watt, AC generator, only | **329.00** |

### GEAR SPEED REDUCER

● **Item #1302.** Ratio 20 to 1. Finest precision quiet gears. Ball bearing. Use with AD frac. h.p. motors for speeds down to 20 RPM. Dozens uses—window displays timing, band saws, etc. Heavy cast A1 case. Govt. cost $47.50. SALE ..... **$8.95 FOB**

### PRESSURE AIR TANK



● **Item #446.** Steel alloy tank for skin divers, air outfits, hydraulic system reservoir, filling tires, etc. ● 400 p.s.i. Internal volume 280 cu. in. (1¼ gal.) ¼" pipe thread port. Size 5¾"x13½". Weight 5 lbs. Govt. cost $9.00. SALE..... **$2.95 FOB**

### SPECIAL OF THE MONTH!

### TURBINE WATER PUMP

● **Item #204.** New Govt. units. Fine for boat bilge pumping, irrigation, sump pump, etc. Finest roller Timken bearings, precision impeller, 1½" intake and discharge ports. ¾" shaft.

● Pump is self priming on low heads such as bilge pumping. Size 12"x10"x18". Wt. 32 lbs. Est. Govt. Cost $97.50. SALE..... **$19.49 FOB**

### BATTERY ELECTRIC WINCH

● **Item #317.** New design battery gear reduction winch. Works off 6 or 12 volt storage battery. Powerful unit. Use on jeeps, trucks, docks, etc. Can be started, stopped, reversed with push buttons up to 20 ft. away from unit. Rating 2000 lbs. or better. 12-volts. Size 19"x9"x7". Wt. 65 lbs. Govt. cost $315. SALE ..... **$68.95 FOB**

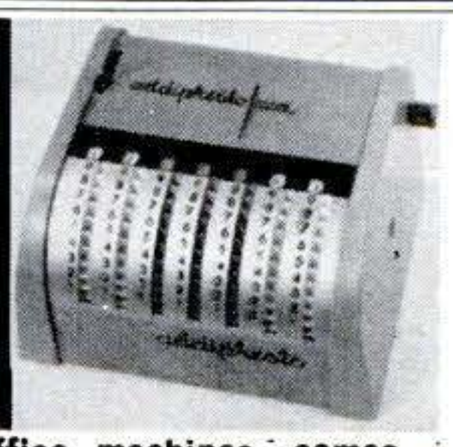
FREE CATALOG

**Electronics, Power Tools, Binoculars, Hydraulics, Power Plants, Air Compressors and thousands of other items.**

**SURPLUS CENTER** LINCOLN, NEBR. DEPT. 825

---

# DESK ADDING MACHINE only $995



From Italy, famous for office machines, comes AddiPresto . . . world's first personal size desk adding machine. Automatically adds to 9,999,999 in seconds! Totals appear **instantly** in easy-to-read answer windows. Saves time and money. Perfect for home or office. Money Back Guarantee if not completely satisfied. Was $14.95 . . .now only $9.95 Shipped postpaid or order C.O.D. plus postage.

**HARRISON HOME PRODUCTS CORP., Dept. 35-PS**
**8 Kingsland Ave., Harrison, New Jersey**

---

# SHIRT POCKET TRANSISTOR RADIO!

**BUILT-IN FERRITE ANTENNA TINY 1½" SPEAKER!** WORLDS SMALLEST REAL RADIO! SMALLER THAN A PACK OF CIGARETTES! Uses two double reflexed TRANSISTORS. **Guaranteed to receive local stations anytime, anywhere!** Uses standard 15c flashlight battery. AMERICAN MADE AND SERVICE GUARANTEED FOR ONE YEAR.

**SEND ONLY $3.00** (cash, ck, mo) and pay postman $6.99 plus postage on arrival or send $9.99 for postpaid delivery. Sent complete. Ready to play! *Available only by mail from:*

**Midway Co., Dept. RPS-3, Kearney, Nebraska**

---

# Print Your Own

Cards, Stationery, Advertising, Circulars, labels, photo and movie titles, church work, tags, etc. Save money. Sold direct from factory only. Raised printing like engraving, too.

**Own a Printing Business**

Print for Others, Good Profit. Have home shop. Junior press $15; Senior $29 up. We supply everything. Easy rules. Pays for self in short time. Write now for free details.

**KELSEY PRESSES, Z-33 Meriden, Conn.**

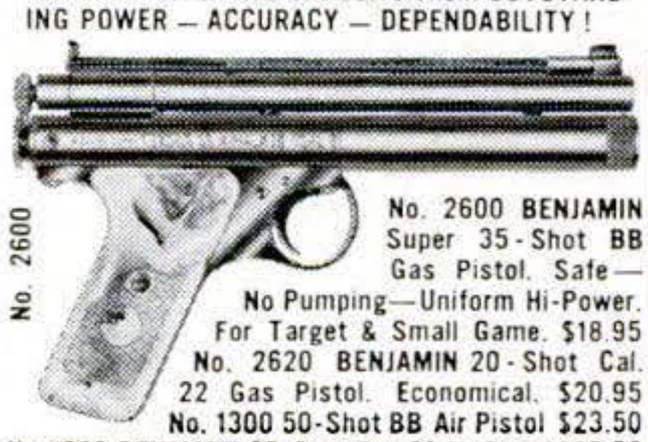
---

# STEP UP to BENJAMIN'S TRADITIONAL EXCELLENCE!

**DISCOVER the BIG DIFFERENCE that EXPERT CRAFTSMANSHIP can Make in Your SHOOTING PERFORMANCE and FUN!**

World Famous AIR GUNS and $CO_2$ GUNS

25 MODELS — SINGLE SHOT and REPEATERS — FIRST CHOICE of SHOOTERS who want SAFETY — CONVENIENCE — ECONOMY including HIGHEST QUALITY MATERIALS to Assure Them OUTSTANDING POWER — ACCURACY — DEPENDABILITY!



No. 2600

No. 2600 BENJAMIN Super 35-Shot BB Gas Pistol. Safe — No Pumping — Uniform Hi-Power. For Target & Small Game. $18.95
No. 2620 BENJAMIN 20-Shot Cal. 22 Gas Pistol. Economical. $20.95
No. 1300 50-Shot BB Air Pistol $23.50
No. 1320 BENJAMIN 35-Shot Cal. 22 Air Pistol $25.50

No. 3600 $19.95

No. 3600 BENJAMIN Super 100 Shot BB Gas Rifle. Non Toxic — Safe — Convenient — Uniform Hi-Velocity Power. →
No. 3620 BENJAMIN Super 85 Shot Cal. 22 Gas Rifle .... $21.95
No. 3100 Super 100 Shot BB Air Rifle. Adj. Shooting Force $24.95
No. 3120 BENJAMIN Super 85 Shot Cal. 22 Air Rifle ..... $26.95

**FREE** Catalog All Models Benjamin Single Shot & Repeaters — Cal. BB or 177 or 22. Also, Special Hunting & Fishing Knife Offer.

**BENJAMIN AIR RIFLE CO., 852 MARION ST., ST. LOUIS 4, MO.**

**You Can DEPEND on . . . BENJAMIN**

---

# U-MAK-IT BOAT KITS

**FIRST AND OLDEST KIT BOAT MANUFACTURER**

Most complete line of PRAMS, ROWBOATS, OUTBOARDS, CABIN CRUISERS and new Lapstrake kits.

**MAIL 25c (coin) for post. & hdlg. for ILLUSTRATED CATALOG**

Showing all models 8' to 23' including accessories, paints, etc. All you need to build your own.

and FRAME KITS

**U-MAK-IT PRODUCTS**
**DELAND, FLA.—Dept. 11**

---

# WELD FOR PLEASURE OR PROFIT
# TRINDL INDUSTRIAL ARC WELDER

Trindl "JOB TESTED" ARC WELDERS

**FREE** Write for Details and Easy Pay Plan

Own a Trindl 125 Amp Industrial Welder at less than smaller machines. Welds metals to ½" thick. Operates off properly wired 110 or 220 volt line. 16 heat stages from 20 to 125 amps. Make, repair anything of metal in the home, garage, farm or shop. No experience or training needed. Full "do-it-yourself" instructions. Guaranteed 12 months in continuous operation. Complete only $98.50 FOB or write for details on 125A and other Heavy Duty Trindl Welders. Dealer Inquiries Invited.

**Trindl Products, Ltd.,** Dept. T3-C, 1807 S. Clark St., Chicago 16, Ill.

**EASY TERMS $98.50 FOB**



Copyrighted material

80 DIFFERENT CLASSIFICATIONS . . . P. S. SELLS TO ALL

*World's greatest classified*

# Opportunities

POPULAR SCIENCE MONTHLY
355 LEXINGTON AVE.
NEW YORK 17, N. Y.

**Classified Ads only $1.15 per word insertion, payable in advance. Minimum ad 10 words. To be included in May issue, copy should be in our office by March 20. No cancellations accepted after March 15. Address orders to O. K. Kelly, Classified Adv. Mgr.**

## 1 AUTOMOBILES & MIDGET CARS

NEW 1904 Antique Automobiles—Full Size. Details. Horton Johnson, Highland Park, Illinois.

CROSLEY or Foreign car parts catalogue. Parts discount club. Box 7, Elmont, New York.

AUTOMOBILE Catalogs, old, modern, foreign; dealer books, service manuals, glossy photographs; motor magazines. Non-Profit organization. Write, get on free mailing list. Auto Maniacs D, Box 451, Mt. Clemens, Michigan.

DETROIT Consumers Newsletter. Biweekly unbiased automotive industry authority. Free copy. Box 4812C, Detroit.

## 2 AUTO SUPPLIES & EQUIPMENT

HYDRAULIC Jack repair kits—free catalog—free "Silent-Salesmen" with each kit. Hydraulic Jack Packing & Tool Co., P. O. Box 50, Bloomfield, N. J.

JEEP Parts! For Military and Civilian. At great savings. Largest inventory. Catalog for owners and dealers. Inquiries invited. American Auto Parts Co., 1830-PS Locust, Kansas City, Mo.

TREMENDOUS Auto Accessories Book. Thousands Do-it-yourself racing and restyling ideas. 25c deposit (refundable). Newhouse Automotive Industries, 5805-PS3 Beverly, Los Angeles 22, Calif.

AUTO shop welding repair training in world's largest non-profit welding school. Low tuition. Free booklet. Hobart Welders, Box P-31, Troy, Ohio.

JUST Out! New 388 page, illustrated Catalog offering savings up to 50% on over 100,000 auto parts and accessories, many hard to get Model "A" parts. All makes (1920 to 1961 models), trucks, foreign and sports cars. Also Karts and accessories. Hollywood accessories, custom styling, Hi-Speed Equipment. Send 25c for postage, packing—refundable on first order. Whitney, 1919 PS-3 Archer, Chicago 16, Ill.

RING-Valve job while driving. Car, truck, tractor. $3.98. Unconditionally Guaranteed. Mota-Nu, P. O. Box 2026P, Ft. Worth, Texas.

HUDSON owners. Wiper cable repair kits $1 pair Postpaid. Hudson Parts, Pinellas Park, Florida.

AUSTIN-HEALEY solid hardwood Dash. Easily installed. Beautifully finished. Standard Grade, $24.95. Grain Selected $34.95. Postpaid. Contourcraft, 5109 Cuming, Omaha, Nebraska.

230 NEW "A" Parts. List 10c. Box 423, Bensenville, Illinois.

PARTS Model "A". List 25c (Refundable) Matco, Box 135, San Pedro, Calif.

"RING-Valve Job" while driving, $6.00 postpaid. Guaranteed!! Nothing like it!! Lasts 100,000 miles!! Motaloy, Grantham 27, Penna.

"CYLINDER-Life" stops compression break down. Automatic continuous maintenance $4.98 Patented. Guaranteed. Postpaid. Box 4159, Los Angeles 54, California.

WINDOW Decals. Any state 15c. Rockland Decal, Nyack 1, New York.

## USE THIS HANDY INDEX TO FIND WHAT YOU WANT

Advertising, Agencies for Advertisers . . . 53
Agents Wanted . . . 43
Antiques, Relics & Indian Goods . . . 29
Authors Service . . . 52
Auto Supplies & Equipment . . . 2
Auto Trailers . . . 3
Automobiles & Midget Cars . . . 1
Aviation . . . 5

Batteries, Generators, Etc. . . . 6
Boats, Outboard Motors . . . 11
Body-Building Courses, Jiu Jitsu, Etc. . . 12
Books & Magazines . . . 23
Business Opportunities . . . 37
Business Service, Information, Name Lists . . . 50
Buy It Wholesale . . . 38A

Cameras, Photo Supplies . . . 34
Camping Equipment & Tents . . . 16
Cartooning, Sign Painting, Chalk Talks . . 54
Coins & Currency . . . 26
Color Photo Finishing . . . 32A
Contests . . . 46

Detectives . . . 47
Diving Equipment & Training . . . 15A
Do-It-Yourself . . . 66
Dogs, Birds, Hamsters & Pets . . . 17

Earthworms, Crickets, Frogs . . . 18
Educational & Instruction . . . 45
Electrical Supplies & Equipment . . . 7
Employment Information . . . 42
Engineering Services . . . 60A
Engines, Motors, Etc. . . . 10

Farms, Other Real Estate . . . 19
Field Glasses, Telescopes . . . 14
For Inventors . . . 60
For Sale Miscellaneous . . . 71
For the Home . . . 69
Formulas, Plans, Etc. . . . 39

Government Surplus . . . 11A

High-grade Salesmen . . . 44
Hobbies, Collections . . . 31
Home Craftsman . . . 65
Hypnotism . . . 24

Import-Export . . . 38B
Inventions Wanted . . . 61

Jokes, Games, Novelties, Etc. . . . 24A

Language Outfits . . . 48
Loans By Mail . . . 80B

Machinery, Tool Supplies, Etc. . . . 9
Magic Tricks, Puzzles, Etc. . . . 25
Minerals & Precious Stones . . . 30
Miscellaneous . . . 79
Models, Model Supplies . . . 64
Moneymaking Opportunities . . . 38
Motion Pictures & Color Slides . . . 33
Motorcycles, Bicycles & Supplies . . . 4
Musical Instruments and Song Writers . . 35

Of Interest To Women . . . 70
Old Gold, Jewelry, Watches . . . 67

Patent Attorneys . . . 59
Personal . . . 80
Phonograph Records . . . 35A
Photo Finishing, Photocopies, Etc. . . . 32
Plastics . . . 40
Poultry & Supplies . . . 21
Printing, Multigraphing, Etc. . . . 57
Printing Outfits, Supplies . . . 58
Profitable Occupations . . . 22

Radio, TV, Electronics, Hi-Fi . . . 36
Remailing Service . . . 80A
Rubber Stamps & Office Supplies . . . 56

Science & Chemistry . . . 41
Sporting Goods, Guns, Fishing Tackle, Etc. . . . 15
Stainless Steel Tanks . . . 9C
Stamp Collecting . . . 28
Swap . . . 79B

Tobacco & Pipes . . . 68
Treasure Finders & Geiger Counters . . . 77
Trees, Shrubs, Roots & Herbs . . . 20
Typewriters & Office Machines . . . 55

Wanted to Buy . . . 72
Watch Repairing . . . 78
Welding, Soldering . . . 8

## 3 AUTO TRAILERS

BUILD Expanding eight foot trailer. Accommodates five. Literature 10c. Fra-Mar Company, Wilmington, Massachusetts.

## 4 MOTORCYCLES, BICYCLES AND SUPPLIES

RECONDITIONED Motorcycle Motors. Chrome accessories. Complete stock Indian parts Expert rebuilding Fast service. Indian Motorcycle Sales, Kansas City 27, Missouri.

1000 MOTORCYCLE Bargains (Example) Servicycles Less Motor And Parts $34.95. Catalogue 35c. Bunico, 146-PG, Covington, Virginia.

BMW Motorcycles, shaftdrive. U.S. Distributor Butler & Smith, Inc., 160 West 83 St., New York 24, N. Y.

GO Cart $30. Whizzer Motorbike $17, Cushman $35, Whizzer Engine $8, Briggs $5, Johnson $2.50. (mailorder only). Send 25c (35c for First Class Mailing) for 32-Page Directory-Catalogue Number 100, listing these and hundreds of other bargains in Go Carts, Motorscooters, Midget Cars, homebuilders parts, plans, etc. Midget Motors Directory, Athens, Ohio.

## 5 AVIATION

HELICOPTERS are our business, not our sideline. A-W, originators of homebuilt helicopters (not autogyros) sells more kits, plans than all others combined. Learn why! Booklet with 3-view drawings, complete prices, regulations, specifications, photos sent postpaid, 25c. Adams-Wilson Helicopters, Lakewood 15, California.

AVIATION Surplus bargain catalogue. One Dime. Box 22PS1, Thomasville, Penna.

AIRCRAFT Tubing supplies for home built karts. Free catalog. MachineCraft, Box 308, Troy, Ohio.

0-100-1 ENGINE, Prop & Accessories. Bargain. King, Box 196, Corning, Ark.

PROPELLERS, Plans, Kits, Supplies for Airboats & Snowplanes 125 H.P. Lycoming Engines $125.00. Prompt Delivery. Catalog 25c. Banks-Maxwell Propeller Co., Box 3301G, Ft. Worth 5, Texas.

## 6 BATTERIES, GENERATORS, ETC.

EXTRA cash? Repair batteries! Complete manual $3.00. Satisfaction guaranteed. Bayer Publications, C938 Betty Avenue, Neenah, Wisconsin.

## 7 ELECTRICAL SUPPLIES & EQUIPMENT

AMERICA'S Finest Conduit Bending Manual. Latest "Simplified-System". $3.00. William Goforth, Box 3061-S, Santa Barbara, Calif.

UNUSUAL Electrical Devices, Wholesale. Literature 25c. Wellsco, Box 3055, North Hollywood, California.

110V FLASHERS 100W capacity 60c each, two for $1.00. Midway Sales, 7319 Grandview Drive, Indianapolis 8, Indiana.

APPLIANCE — Lamp parts wholesale. Buy direct! Save money! Illustrated catalogue 25c. Seco, 26 South 20th Street, Birmingham 3, Alabama.

LAMP parts. Wholesale. Thousands of items for repairing, converting. Catalog 25c. Brown Lamp, Box 305-D, Clayton 5, Missouri.



Copyrighted material

## 8 WELDING, SOLDERING

WELDERS, 110-220. Welds ½". $39.50. Morris, 1070 Inner Drive, Schenectady, New York.

FREE Catalog. Welders, Kits. Build 350-ampere welder using aircraft generator, plans 25c. Dunbar, Minneapolis 8, Minnesota.

ARC Welder Manual . . . Only 50c . . . regular $1.00 value. Tells how to weld every job. Emerson Electric, 8100 Florissant, St. Louis, Missouri.

FREE catalog. Welders, welder kits, supplies. Buy or build 350-ampere welder using aircraft generator. Plans 25c. LeJay Co., Minneapolis 20, Minnesota.

NEW Arc Welding Method, ½" Plate. 85 Amperes. Hobbyists, Automobiles, Farm Equipment. Locally, Under $5.00! Assembled Five Minutes! No Skill! Details $1.00. Discovered By Electrical Engineer. Box 487, East Pittsburgh, Pennsylvania.

## 9 MACHINERY, TOOL SUPPLIES, ETC.

FREE New Catalog showing only complete line of work holding tools available anywhere. Drill press vises, angle and swivel machine vises, rotary tables, production and heavy duty angle vises, 68 different models, fully described with prices. Palmgren Products Co., 8366 South Chicago Ave., Chicago 17, Illinois.

POWER Tools Wholesale. Free Catalog. Roberson, 14B Brooks Drive, Austell, Georgia.

SHEET Metal brakes: 36"—$37.00. Larger sizes, Benders, folders, shears. Free catalog. Vyke Company, N4158 Jason, Denver 11, Colorado.

TOOLMAKERS' Hole and Slot gages. Campbell Tools, 1424 Barclay, Springfield, Ohio.

## 9C STAINLESS STEEL TANKS

STAINLESS Steel Tanks. 24" x 48", 400 PSI. $300 value, $99.50. Size 8½" x 18", $14.50. ¼" pipe thread each end. Imsco, 1829 S. State, Chicago 16, Ill.

## 10 ENGINES, MOTORS, ETC.

DIESEL Injector Parts and Fuel Pumps Wanted GM51-71-110. Mayer, 7120 Carnegie, Cleveland 3, Ohio.

REWIND Motors yourself. Complete instructions $1.00. Lewis Manufacturing, Howell 11, Michigan.

FOR Sale—Gasoline engines. 6 hp, 9 hp, 12 hp, 14 hp, and 18 hp. A complete line of Wisconsin and Kohler engines at factory cost. Finco, Inc., 525 Rathbone Avenue, Aurora, Illinois.

## 11 BOATS, OUTBOARD MOTORS

NEW, used, rebuilt marine motors. Marine conversions, fittings. Free Catalog. Stokes Marine Supply, Dept. 23, Coldwater, Mich.

FULL size, cut-to-shape boat patterns, blueprints. 7½-38 feet. Big new 88 pg. illustrated "Build a Boat" Catalog of Naval architect-designed Catamarans, Cruisers, Runabouts, Skiffs, Outboard Boats, Sailing, Racing, Houseboats. 50c. "How to Build a Boat" Booklet, $2.50. Equipment catalog $2.00. Cleveland Boat Blueprint Co., Dept. A-77, Box 1651, Cleveland, Ohio.

FRAME Kits, Plans or full-size Patterns for 35 Inboards and Outboards. Prepared for Amateur Builders. New 80 page illustrative catalog—50c. Glen Marine, 9152 Rosecrans, Bellflower, Calif.

CATAMARAN—Plans, Frame Kits, Patterns. 16 years experience is yours in proven sail and power catamarans 12' to 150'. Catalog $1.00. F. H. "skip" Creger, Box 3305-E, Long Beach 3, Calif.

FIBERGLAS Boat Covering, Wholesale prices. Free literature and samples. Seifert's, Box 31X, DePere, Wis.

ALL Sailboat Hardware And Equipment. Immediate Swaged Rigging Service. Catalog $1.00 Refundable. Fawcett's, P. O. Box 1511A, Annapolis, Maryland.

CANOE—Boat—Kayak Kits From $24.95. Free Catalog. Aquacraft, Box 211, Trenton, N. J.

BOAT Docks, build yourself or for profit. Complete plans, specifications, instructions for six different models. Send $1.00. National Floating Dock Co., 1717 Gent, Indianapolis 2, Ind.

300 BOAT Plans, Kits. Catalogs. Powerboat $1.00. Sailboat 25c. Marinecraft, Box 161-P, Brighton, Mass.

## 11A GOVERNMENT SURPLUS

JEEPS—$223.83, Radios—$2.45, Tires—$1.78 Chains, Tools, Clothing, Typewriters. Typical Surplus Prices. Buy Direct. List of Depots, Procedure. Full Details Only $1.00. New York Enterprises, Wall Street Box 402-S4, New York 5.

JEEPS $278.00, Planes $159.00, Boats $7.80, Generators $2.68 are typical government surplus sale prices. Buy 10,001 items wholesale, direct. Full details, 627 locations and procedure only $1.00. Surplus, Box 8PS3, Thomasville, Penna.

BARGAINS—Jeeps, clothing, electronics. Thousands other articles. Some Free. Write. Clyde Lee, Mountain View 25, Oklahoma.

BUY War Surplus Direct From the Government—Airplanes, Boats, Jeeps, Trucks, Tractors, Helicopters, Walkie-Talkies, Radar, Misc. Send for Brody's "U.S. Depot Directory & Procedures" $1.00. Box 425-PS, Nanuet, New York.

GOVERNMENT Surplus—Jeeps, $264.00; Radios, $2.53; Boats, $36.00; Guns; Airplanes; Walkie Talkies; Typewriters; Cameras; Tools; thousands of items. Buy direct from government at ridiculously low prices. Full details and procedure all yours complete by return mail, only $1.00. Surplus Bargains, Dept. PS, P. O. Box 512, New Orleans, La.

## 12 BODY-BUILDING COURSES, JIU JITSU & ATHLETIC EQUIPMENT

KARATE! Judo! Yoga! Musclebuilding! Boxing! Stunts! 125 individual, illustrated lessons. All for $1.00. Scientific instructions, deadly secrets. Charts! Diagrams! Sanson Institute, 44A Bromfield, Boston 8, Massachusetts.

BUILD powerful arms, chest, shoulders! 22 exercises, $1. Fonsad, Box 601-C, 1100 Market, Wilmington 99, Delaware.

4 MUSCLE courses 25c (Guaranteed). Sid's System, PS-5, 8421-C Evergreen, Southgate, California.

"BIG Muscles. The Quick Way." Dr. Young's revolutionary discovery. Free information. Gaucho, Box 9309-S6, Chicago 90.

OUTSTANDING Physical Development! Any Age. New Guaranteed Discovery Uses Only A Rope! Strength, Health, Muscles. Gain-Reduce. Free Booklet. Ropercise, 4834-A Art, San Diego 15, California.

BARBELLS, Exercise Equipment Catalogue 10c. Reading Barbell Co., Reading, Pa.

PUSHED around? Don't take nonsense from bullies. Surprise them. Easy when you know Police Jiu Jitsu. Complete fully illustrated course in one volume as taught police and armed forces. Send $1. now. Satisfaction guaranteed. Books Publishing Co., Amityville 39, New York.

## 14 FIELD GLASSES, TELESCOPES

DYNASCOPE—Amazing world famous reflector telescope. Request free brochure. Criterion, Dept. DS-82, Hartford 1, Conn.

WAR Surplus bargains! Millions of lenses, instruments, telescopes, binoculars, components and complete line of astronomical telescope items. World's greatest optical market place. Send only $1.00 for beginner's 10-lens kit and big instruction booklet Stock 2-CN. Write for catalog-CN Free! Edmund Scientific Co., Barrington, New Jersey.

FREE Catalogue! Thousands war surplus optical bargains. Lenses, Prisms, Telescopes, Binoculars, etc. Send $1.00 for 10 Lens Hobbyist Set and Project booklet. G. Jaegers, 691 West Merrick Road, Lynbrook, New York.

WINTER sale, guaranteed, money back Binoculars. Catalog free. Prentiss Importers, Mercury Bldg., West Los Angeles 25, Calif.

CELESTIAL reproductions of observatory photographs. Free catalogue. Astro Murals, 33P West 60th St., New York 23, N. Y.

BUILD your own Reflector Telescopes. Complete kits; Mirrors, Eyepieces, Tripods, all other accessories. Request free illustrated literature. Criterion Manufacturing, Dept. KP-75, Hartford 1, Conn.

BINOCULARS, Telescopes, Microscopes. Terrific values $3.98 up. Request free money-saving catalog. Criterion, Dept. S-2, Hartford 1, Conn.

REFLECTING Telescope completely assembled. 60X. Guaranteed Observatory clearness. Free information. The Skyscope Co., P. O. Box 55, Brooklyn 28, New York.

PRECISION made reflecting telescope. Free literature. Southland Products, Lincolnton, North Carolina.

TELESCOPES, Binoculars — all sizes. Complete telescope makers supplies. Free catalog. Suffolk Science, Mattituck, New York.

TELESCOPE kits—direct from manufacturer. Other optical hobby kits. Large selection. Free booklet. Esco Products, Oakridge, N. J.

ASTRONOMICAL books, star-atlases, free list. Herbert Luft, 69-11 229th St., Flushing 64, N. Y.

## 15 SPORTING GOODS, GUNS, FISHING TACKLE, ARCHERY, TRAPPING

100,000 PRODUCTS Wholesale — Free catalog! Send postcard: Econ-O-Mart, Whippany 16, New Jersey.

FREE . . . Wholesale Catalog. Beads, Spinners, Lure parts, Sinker molds, Jigs, Reels. Finnysports, (PE), Toledo 14, Ohio.

SEND me your name and I'll tell you about a method that lets you take giant bass out of waters that other folks say are "fished out." Facts free. Write Eric P. Fare, Highland Park 34, Illinois.

10,000 GUNS!!! — Antiques, Moderns, Swords, Armour—every description. Giant Catalog $1.00. Agramonte's, Yonkers 2-A, N. Y.

154 PAGE catalog—a real "Dream Book" for fishermen! It's free! Netcraft Company, Dept. A-3, Toledo 13, Ohio.

MOLDS for Fisherman's Sinkers, Jigs, Squids, Casting and Spinning Lures. Free Catalogue. Sweet's Molds, Tonawanda 3, New York.

5000 GUNS, Swords, War Relics. Catalog 50c. Smith Museum, Runnemede, N. J.

CROSSBOWS! Hunting—Bows! Factory Prices! Jayco, Box 1355, Wichita, Kansas.

JAP rifles altering American shells $6.00. Jap shells $3.95, catalog 10c. TP Shop, West Branch 10, Michigan.

## 15A DIVING EQUIPMENT & TRAINING

SKIN Diving for Fun and Profit. Underwater gold prospecting, etc., $1.00. Skin Divers, Box 492, Mankato, Minnesota.

## 16 CAMPING EQUIPMENT & TENTS

CAMPING Equipment, world's largest selection. Low prices. Send 25c (print name—address) for complete giant catalogue of Tents, Camping Equipment, National Camp Sites Guide & Camping Handbook. Morsan Tents, 10-15G 50th Ave., Long Island City 1, New York.

## 17 DOGS, BIRDS, HAMSTERS, RABBITS & PETS

RAISE Rabbits on $500 month plan. Free details. White's Rabbitry, Mt. Vernon, Ohio.

1000 BRED Mink. Booklet, Plans—25c. Wettlaufer, Gravel Rd., Webster, N. Y.

HAMSTERS—Ideal Pets, $2.95 pair. Free booklet. Jer-Fre's Hamstery, 1447 Apple, Muskegon 18, Michigan.

RAISE Rabbits. Make Money. Information and prices sent free. Write Johnson, 683, Kansas City 41, Missouri.

EARN $10,000 yearly raising Angora Rabbit Wool for us. Information 25c coin. American Angora Company, Malta 1, Montana.

## 18 EARTHWORMS, CRICKETS, FROGS

$1000 MONTHLY Possible, raising Earthworms—African Giants! Backyard, Garage, Basement. Complete Illustrated Booklet, explains raising, feeding, packing, marketing. Send 25c! Ozark Worm Farm-V, Willow Springs, Missouri.



Copyrighted material

FROG raising for pleasure and profit. We ship "Nufond" giants. Broel-C, Box 506, New Orleans 1, Louisiana.

FREE Literature. Big money raising fishworms and crickets. We teach you how to raise and sell. Special Today! Hybrid red wigglers, 3000—$5.95, 5000—$8.95, 10,000—$16.95 Postpaid, with raising and marketing instructions. Read our Life Magazine Story, Dec. 28, 1959 issue. Carter Farm-12, Plains, Georgia.

FREE Picture Folder, "How to Make $3,000 Yearly, Sparetime, Backyard, Raising Earthworms!" Oakhaven-121, Cedar Hill, Texas.

RAISE Earthworms. Red wigglers, night crawlers. Write for details. Sample order 150 large red wigglers $1.00, 1,000—$4.50 Postpaid. Raising instructions included. Campbell's Fishbait, Fort Payne, Alabama.

## 19 FARMS, OTHER REAL ESTATE

CANADIAN Tax Sale Property: $5.00 acre. Terms $10.00 month. Fishing, Hunting, Investment, Vacationing, Timber, Minerals. Free information. Land Corporation, 3768-D Bathurst, Downsview, Ontario, Canada.

FOR Sale: ¼ Acre Homesite in Florida —Private lake with country club privileges, $695 complete, only $10 down & $10 a month. Guaranteed high dry ¼ acre homesite in this private resort development set in the Central Ridge among the highest, driest elevations in Florida! Ideal location on U.S. 41; only 2½ miles from Rainbow Springs, only 6 miles to Dunnellon, "Home of World's Best Bass Fishing"; schools, churches, shopping, deep-water fishing lakes right at the property, free membership in private country club; lovely homes, Hard-Paved roads under construction. All for amazing low $695 price per ¼ acre site in one of Florida's largest homesite developments. For low cost living, retirement, investment, write for free color brochure plus 24-page booklet of facts, maps, photos; no obligation. Send now to beat coming price rise. Ad59072(ZO). Rainbow Lakes Estates, Dept. FB-142, 819 Silver Springs Blvd., Ocala, Florida.

FLORIDA Homesites (high and dry) near National Forest $345 at $10 monthly. Folder free. Winfree Vernor, Deland, Florida.

CANADIAN Tax Sale Lands, average price five dollars an acre. Small monthly payments. Farms, timber, hunting and fishing camps, minerals. Limited number of properties. Write at once for free catalogue. Tax Sale Service, Room 411-H, 1173 Bay St., Toronto 5, Canada.

FLORIDA'S Greatest homesite value. High, dry ¼ acre site, $395. No money down, $10 monthly. Free photos, write Dept. 619-E, Rainbow Park, Box 521, Ocala, Florida. (AD59067Z-2).

NEW Strout Spring Catalog Just Out! Free! Farms, Homes, Businesses; 36 States, over 4,000 properties described; established 61 years. World's Largest. Strout Realty, 251-ZB Park Ave. So., New York 10, N. Y.

FLORIDA 2½ acres, $5 down, $5 month. Speculative land without roads—excellent capital gains opportunity! Free: Map P16. Gaylord Wood, Broker, Fort Lauderdale, Florida.

FLORIDA Homesites. $10 down, $10 monthly buys your homesite in Central Florida's finest retirement and vacation community in the high ridge section 16 miles south of Sebring. On 84 square mile Highlands Lake. Free community parks and beaches. Get free color brochures, house plans; Learn how we help you plan, finance, build your low-cost custom home. Write Florida Realty Bureau, Inc., (Dept. E43), 520 N.E. 79 St., Miami 38, Florida. AD58101 (Z-C).

CAROLINA Coast. $4 down, $4.40 monthly buys large homesite, 70x150, in beautiful Boiling Spring Lakes. Satisfaction guaranteed. 16,000 acres. 52 freshwater lakes. Free literature. Charlie Pratt, Southport 2, N. C.

## 20 TREES, SHRUBS, ROOTS, HERBS

RHODODENDRON, Azalea Hybrids from seed. Details free. Ference Nursery, Point Pleasant, Pa.

GINSENG bringing $14 pound. Have seeds, plants. Goldenseal. Full information. G. Collins, Viola, Iowa.

## 21 POULTRY & SUPPLIES

NEW Poultry Book 25c. Refundable. 54 true to color pictures. Over 100 popular fancy varieties illustrated. "How to win prizes" included. Stromberg's, Fort Dodge 57, Iowa.

## 22 PROFITABLE OCCUPATIONS

INVESTIGATE Auto Accidents—Earn $750 to $1,000 monthly. More investigators urgently needed. Car furnished; business expenses paid. No college education necessary. No selling of any kind. Pick your own job locality. Meet interesting, important people. We train you at home in spare time. You keep present job until ready to switch. Write for Free Booklet. No obligation. Liberty School, Dept. 21, Libertyville, Illinois.

FREE Literature—Make Big Money Raising Fishworms and Crickets. Carter Farm-10, Plains, Ga.

FREE Picture Folder, "How to Make $3,000 Yearly, Sparetime, Backyard, Raising Earthworms!" Oakhaven-7, Cedar Hill, Texas.

INVESTIGATE Accidents—Earn $125 week to start. Claim Investigators are urgently needed to investigate more than 490,000 accidents daily. Work full time for insurance company, railroad, steamship line, or government office. Or step into your own profitable spare time business. No experience needed. Free book—Now! Universal Schools, B-3, Box 8227, Dallas 5, Texas.

MAKE Money Writing Short Paragraphs. Information Free. Barrett, Dept. C-86-B-A, 7464 No. Clark, Chicago 26.

BECOME independent with your own franchise business. Thousands earning handsome incomes. Request interesting facts today. National Franchise Reports, Y-528, 333 North Michigan, Chicago 1.

VENDING Machines—No Selling, Operate A Route of Coin Machines and Earn Amazing Profits. 32-Page Catalog Free. Parkway Machine Corporation, Dept. 17, 715 Ensor Street, Baltimore 2, Maryland.

RETIRED at 47 operating plan—home! Get "Profit March 1935-1968". Haylings, Carlsbad, Calif.

FREE Book "990 Successful, Little-Known Businesses." Work home! Plymouth-45W, Brooklyn 4, New York.

## 23 BOOKS & MAGAZINES

GOOD Used Books, 50c-$1. Free Lists. Editions, Dept. PS, Hempstead, New York.

BRITISH Book Bargains. Any subjects. Catalogues free. Transbooks, Wantagh 77, New York.

BOOK Disposals: 10 different including large issues $1. 32—$3. Samples, something different 30c. Persil, 436 New York Avenue, Brooklyn 25, N. Y.

ATHEIST Books. Catalogue free. Truth Seeker Co., 38 Park Row, New York 8.

SAVE 20% to 80% On Books. Free Catalog. Discount Reader's Service, 1SC-5435 Upland Way, Philadelphia 31.

7000 GOOD Books 50% To 90% Off! List Free. Werewolf Bookshop, Verona, Penna.

BRIDGE—Official Better Bridge Digest, $1.00. Box 3, Janesville, Wisconsin.

FINE Books! Almost 2000 titles. Renowned authors. Only 10c each, postpaid. Catalog Free. Sharon, Box 5114-J, Kansas City 32, Missouri.

BOOKHUNTERS: All Subjects. Send Wants! Jaher Book Service, 183 Hazelwood Drive, Westbury, New York.

INEXPENSIVE Civil Service Home Study Guides. Details Free. K. Waters, Gibbsboro, N. J.

100,000 BOOKS—10c Each! Astonishing Subjects! Tons Titles! Free Catalogs. "Bargains," 1323-MV Chaparral, Corpus Christi, Texas.

MAGAZINES Wholesale-Retail catalogue 10c. Backdates, 1181 East Lombard, Baltimore 2, Maryland.

ADULTS Only. Books Discussing Sex Variations! Free Catalog. Welchel, Limited, Black Mountain 31, North Carolina.

FIRST American Edition Of "Economic Tribulation" By Vincent C. Vickers, $2.00. Free Brochure Listing Other Books On Money Question. Omni Publications, Box 216, Hawthorne, California.

MILLIONS of Back-Date magazines. Send want list. No catalogues. Midtown Magazines, 1105-C 6th Ave., New York 36.

NATIONAL Geographic Magazines, Any issue, 1888-1960. Periodical Service, Box 465-PS, Wilmington, Delaware.

BIBLES, Books, Bargains, Free Literature. Price, 4813 Hurford, Chester, Penna.

## 24 HYPNOTISM

HYPNOTIZE Self, Others while asleep with amazing hypnotic phonograph records, tapes. Catalog free. Research Association, Box 24-G, Olympia, Washington.

FREE Illustrated Hypnotism, Selfhypnosis Catalogue. Write: Hypnotist, 8721 Sunset, Hollywood 46P, California.

WORLD'S largest catalog free. Merlin Enterprises, 1244 Lincoln Avenue, San Jose, California.

HYPNOTIZE Successfully! "One Word." "Instantaneous," "Against Will" Methods Exposed! Complete Illustrated Course—Including "Secret Nerve Pressure Technique" $1.00. Arthur Fowler, Box 4391, Woodbury, New Jersey.

HYPNOTIZE Unnoticed, quickly, effortlessly, or refund! Thousands satisfied! $2. Imtern, Box 244, Cedarburg, Wisconsin.

HYPNOTISM. Selfhypnosis. Guaranteed home study courses. Diploma issued. Free brochure. School Hypnology, 1564C Hannington Ave., Wantagh, New York.

PROFESSIONAL Hypnotism Correspondence Training by State Chartered School. Free Brochure. Institute of Mental Science, Inc., 5880 Hollywood Blvd., Hollywood 28, California.

FREE Hypnotism, Self-Hypnosis, Sleep-Learning Catalog! Records, Tapes, Books, Courses, Equipment! Drawer PS697, Ruidoso, New Mexico.

"HYPNOTIZE . . One word . . . One fingersnap," on stage. Satisfaction—or refund. $2. Hypnomaster, Box 9309-S6, Chicago 90.

AT Last! Proven new concept of self-hypnosis teaches you quickly, easily! Book! Tape! Record! Free literature. McKinley Publishers, Dept. SP, Box 3038, San Bernardino, California.

LEARN While Asleep (Method 92% Effective). Develop A Powerful Personality. Control Weight And Tension With Electronically Proven Transitional Sleep Methods. Details Free. A.S.R. Foundation, Box 21-Z, Henry Clay Station, Lexington, Kentucky.

HYPNOTIZE Instantly, Effortlessly, Professionally, Or Refund! Proven Methods. $2.00. Welchel, Black Mountain 33, North Carolina.

HYPNOTIZE instantly! Easiest, quickest method. Complete course, $1.00. Bell, Box 1532-P, Melbourne, Fla.

HYPNOTIZE the same day and use self-hypnosis. For full instructions send $2.00 to G. Smith, 632 Braxton Road, Ridley Park, Penna.

## 24A JOKES, GAMES, NOVELTIES, ETC.

3100 NOVELTIES, Jokes, tricks, gadgets, funmakers, hobbies. Big catalog 10c. Johnson-Smith, D-495, Detroit 7.

MEN Only! Surprise Package! $1.00. Enterprises-C, Box 266, Spring Valley, New York.

## 25 MAGIC TRICKS, PUZZLES, ETC.

WORLD'S finest professional magic Joker novelties, Giant illustrated catalog 10c. Top Hat, Evanston 13, Illinois.

WIN, Dice, Cards. Catalog 10c. Books, Box 671, St. Louis 1, Missouri.

500 TRICKS—Douglas latest edition 120 page catalog now available. Complete catalog—magic tricks and equipment—just 10c. World's fastest service. Douglas Magicland, Dept. 62, Box 274, Dallas, Texas.

3000 TRICKS, pocket, parlor, stage. World's Finest Magic Catalog (408 pages). $2.50. Kanter's, S-1311 Walnut, Philadelphia 7.

INDIA Rope Trick And Magic Catalog 25c. Hocus Pocus, 209 West Capitol, Jackson, Mississippi.

FREE Trick and Magic Catalog 25c. Castle Magic, Box 92-PA, Jamaica 35, New York.



Copyrighted material

1000 WAYS to have fun with Jokes, Tricks, Magic! World's greatest catalog! 160 Pages! 800 Pictures! Exciting! New! Only 10c. House of 1000 Mysteries, Dept. PS3C-61, Trumbull, Conn.

MAGIC Catalog, 35c. Eagle Magic, 713 Third Avenue South, Minneapolis 2, Minn.

## 26 COINS & CURRENCY

BARGAINS! Rare Collection contains—United States Large Cent over 145 years old, Eagle Cent, Indian Cent before 1866, 1909-V.D.B. Lincoln Cent, 2c Piece, 3c Piece, Halfdime, First Liberty Head Nickel, 1913 Nickel, Dime before 1892 and our large Illustrated Complete Guaranteed Buying-Selling Catalogue giving the true value of Rare Coins. Everything for $10.00. Half Cent before 1830—$3.00. 1864-L Cent $5.00. 1909-S Cent $15.00. 20c Piece $6.00. Columbian 50c—$2.00. Half Dollar before 1837—$3.00. Trade Dollar $7.00. Colonial Coin before 1790—$4.00. Everything listed for only $50.00. We have been leaders of Numismatic Quotations for over Twenty Years and have purchased over $250,000.00 worth of Rare Coins. Whether your coin is worth $10.00 or $40,000.00, we'll pay the highest prices of any Catalogue Dealer. Thousands of persons have sold us coins. Practically every dealer uses our Catalogue as Buying-Selling Guide—price $1.00. Worthycoin Corporation (C-154-D), Boston 8, Massachusetts.

OLD Coins Bought. Illustrated Catalog 25c. Hutchinson's, Box 4747, Philadelphia 34, Penna.

BARGAIN List! U.S. Coins, Accessories. Stamp please. Hugh's, Hickory, N. C.

LARGE Old Type Dollar Bill $2.00, Large Two $4.00, Large Five $9.00, Bargain Lists Free. Sayers, 1000 Unaka, Johnson City, Tennessee.

INDIAN Pennies 8 Different $1.00. Joseph Gaidar, 6615 South Ashland, Chicago 36, Illinois.

INDIAN Head Cents, two different only 20c. Approvals. Littleton Coin Co., Littleton R2, New Hampshire.

POCKET change worth a fortune? Send $1 for illustrated U.S. coin catalog that lists prices we pay! Price refunded on any coins purchased. Centre Coin Co., 5 Centre St., Hempstead 97, N. Y.

BRILLIANT Proof Sets, "Mint Sealed". 1956—$7.25, 1957—$4.35, 1958—$9.25, 1959—$4.75, 1960—$3.75, 1961—$3.00. Satisfaction Guaranteed. Thomas Lavin, 6751 Paschall Ave., Phila. 42, Pa.

NEW 68-Page Foreign-U.S. Coin Catalog 25c (Refundable). Jolie, Roslyn Heights, New York.

LINCOLNS: 40 1909-40 $1.85. 30 "S" $1.95. Indianheads: 12 $1.75. All Different. Harris, 1457 Moreno, Oceanside 3, California.

80 DIFFERENT U.S. Pennies, 1890's On, $3.00. Wesley Rood, Hiawatha, Iowa.

WANTED recent issue coins. Highest prices paid. Our catalog lists these recent coins and hundreds of other rare coins together with illustrations and our buying prices. Catalog price refundable after selling us coins. Send $1.00 today to Roberts Coin Company, Box 207P3, Endicott, New York.

WANTED U.S. & Canadian Coins. Buying List 10c (Refundable). Holcomb, Box 66002, Los Angeles 66, Calif.

PRESIDENT Kennedy Official Inaugural Medal—bronze $5.00; Silver $36.00. 1957, 1959, 1960 Gem Proof sets, each $5.00; 1961 $3.00; Any set encased in Glittering Lucite Cube "Paperweight" $10.75. Retail Guidebooks—U.S. $1.75. Bebee's, 4514 North 30th, Omaha 11, Nebraska.

FREE Bonus Offer! U.S. Bargain List, 10c (refundable). Economy Sales Company, Mansfield, Massachusetts.

LINCOLN Cents: 1923-s, 1921-s, 1924-s, 1916-s-d, 1909-p, 1925-s-d, 1938-s-d, 1930-s-d, 1955-s-d, 1917-s-d, 1918-s-d, 1919-s-d, 1920-s-d, 1934-d, 1931-p. Good to fine, Complete Lot $3.95. Rolls of 1955-s Lincoln cents Fine to A.U. $4.25 Roll. Berry, Box 306, Westminster, Calif.

EIGHT Different Indian Cents $1.00, Plus Free Lists. Hutchinson's, Box 4747, Philadelphia, Penna.

BARBER Dimes, 20 different, $5.95, 30 different $11.95, bargain list included. Vacoin, Box 10, Richmond 1, Virginia.

25 DIFFERENT coins from 25 foreign countries, $1.00 Bargain. Hindley, Box 708, Aurora, Ill.

COINS wanted, buying list 15c. Coin Searcher, Box 332, Hollywood 28, Calif.

LINCOLN Cents 14 different before 1921 $1.00. Price List 10c. R & M Coins, Delanco, New Jersey.

RARE 1878 CC Mint Dollar. Uncirculated $5.00. 100 pg. coin catalogue 50c. Shultz, Salt Lake City 10, Utah.

TWENTY page 1961 retail price list of U.S.A. and Canadian coins for 10c. Our selling prices on thousands of coins and coin collectors' supplies. Bryson Incorporated, 612B White, Toledo 5, Ohio.

BRILLIANT Uncirculated Mexican Silver Dollar—50c. (Refunded First Order—Unrestricted.) Universal Services, Box 866, San Antonio 6-A3, Texas.

NUMISMATIC'S Largest Newspaper. Semi-Monthly. Sample 25c. $2.00 Yearly. Numismatic News, Washington Street, Iola, Wisconsin.

U.S. coin list 10c Contains over 100 illustrations; over 5,000 delightful bargains. Stoney, 260 Washington, Boston 8, Mass.

COIN Magazine, 200 pages. Sample 50c. Numismatic, 7320 Milwaukee, Chicago 31.

## 28 STAMP COLLECTING

80 DIFFERENT U.S. Stamps. Includes 19th Century Commemoratives. High Values. Plus 1943 Flag Stamp of occupied Nations. All for only 25c. Approvals included. Willett C., Box 338-Y, Yorktown Heights, N. Y.

100 DIFFERENT Stamps, 10c with approvals. Smith, 508U Brooks, College Station, Texas.

AMAZING Offer! 200 U.S. stamps—including commemoratives, airmails, high denominations to $1.00—only 10c to Approval Applicants!! Illustrated Bargain Lists free. Mystic Stamp Co., Dept. 55, Camden, New York.

EXCEPTIONAL 125 different, cataloging $3.00, includes triangles, commemoratives, 10c, approvals. Reeves, Box 37597P, Miami 37, Florida.

UNITED States commemorative collection containing 33 different—10c. Approvals. White, 516-W Avenue L, Brooklyn 30, New York.

WORLDWIDE, 50 all different, absolutely free, just to introduce our incomparable approvals. Kent Stamp Company, GPO Box 87, Brooklyn, New York.

TWO $5.00 United States Stamps, twenty others 10c with United States approvals. Irwin, Box 1109, Brooklyn 30.

NUDES set (4)—Unusual Approvals 10c. Atlas, Plainfield, Racine, Wisconsin.

ALBUM! Hundreds of Spaces! Only 10c. Postpaid! Stampmart, Hartford 1, Connecticut.

500 WORLDWIDE for 25c! Contains U.S.A., Russia, First U.N., Summit Conference, Olympics, Space Satellite,—hundreds more! Approvals, illustrated offers included. Horace Gatewood, Winston-Salem, North Carolina.

MYSTERY Bag Stamp Collection, Only 10c. Hill Company, Defiance, Ohio.

225 STAMPS For only 10c! This mammoth value includes Airmails, Pictorials; stamps from strange Countries cataloguing up to 25c each! Also Approvals. Mystic Stamp Company, Camden 55, N. Y.

25 DIFFERENT Large American Commemoratives. 10c with approvals. Linstamp, St. Catharines 102, Ontario.

105 DISSIMILAR British Colony stamps, 10c. Approvals. Crown Stamp Company, Virgil 602, Ontario.

1,000 DIFFERENT Worldwide Stamps $1.00. Valued over $20.00. To introduce our unique services. Universal, Box 6, Kenosha 6, Wisconsin.

GIANT Topical Collection: Moonrocket sets, Satellites, Atomic Ship, Boy Scout issues, Complete UN Set, latest Olympics and Sport issues from Togo, Mongolia, Paraguay, Germany, Romania, Etc. Plus Big Stamp Dictionary and Approvals. Everything 10c! Stampex, Box 47-CP, White Plains, N. Y.

307 WORLDWIDE Different Stamps only 25c. Approvals. Niagara Stamps, St. Catharines 202, Ontario.

90,000 STAMPS Sale: Bargain Lot Including Packets, Sets, Rare Stamps, Gift And Free Imported Samples $1. Only. Extra Special $2 Giant Sellout Assortment $5. High Value Packet $3. Persile, 436 N. Y. Ave., Brooklyn 25, N. Y.

STAMP Jungle including Zabu, Kookaburra, Koalabear, Kangaroo, Rhinoceros, 10c. Approvals. Crown Stamp Company, Virgil 302, Ontario.

103 DIVERSIFIED British Empire stamps, 10c. Approvals. Niagara Stamps, St. Catharines 502, Ontario.

FREE!—Albums—Catalogues—Philatelic Gifts to purchasers from our approval selections. Thousands. Bargains for pennies. Write today. Stamps, Box 312, Orange, California.

107 DISTINCT British Colonial Stamps, 10c Approvals. Linstamp, St. Catharines 402, Ontario.

SUPERIOR worldwide mission mixture, extraordinary variety! Six ounces $1.65. Pound $3.95. Bay Nielsen, 4545A Harvard, Montreal 28, Canada.

FREE! 25 Different New Zealand; colorful, inexpensive approvals. Elkhart, Box 33, Elkhart, Indiana.

100 DIFFERENT Belgium Free to adults requesting approvals. Includes UPU, Brussels Fair, Railroad Stamps. Trylon, Brooklyn 30, N. Y.

508 DIFFERENT World-wide from Formosa, Morocco, Indonesia, etc. cataloging over $15, only 35c. Offer to Adults only. Approvals. Littleton Stamp Co., Littleton Q2, N. H.

DIAMOND Roosevelt, Pope, Triangle, Greenland, Angola, 51 others 5c. Approvals. Longhorn, Box 3068P, Lubbock, Tex.

FREE! Triangles, Pictorials, Others. 55 Different. Colorful, Unusual Approvals. Baird, Box 8113, Portland 7, Oregon.

FANTASTIC Fish Triangles!! Valuable "Ben Franklin" on anal Zone!! Claming bi-colored Volcano Triangle!! Lovely Olympics Triangle!! Plus Icy Greenland, Weird Wild Beast issue and others, 10c with approvals. Roseland Stamps, Spring Lake 10, Michigan.

"OLD Glory" In Flaming Colors!!! USA Flag giant beauty from Honduras! Enormous United Nations Mexican Stamp! Plus Strange Gorilla issue, Duke of Windsor, Morocco, lovely Macao lowers, Wild Buffalo stamp & others. 10c with approvals. Sunny Stamps, Apopka 10, Florida.

GIGANTIC Collection Free—Includes Triangles—Early United States—Animals — Commemoratives — British Colonies — High Value Pictorials, etc. Complete Collection plus Big Illustrated Magazine all free. Send 5c for postage. Gray Stamp Company, Dept. PR, Toronto, Canada.

WEIRD Diamond Shape Coffee Stamps —Lovely Flower Triangle; First American big commemorative. Greenland, Idol Dancer, etc. 10c with approvals. Capital Stamp Co., Ferrysburg 10, Mich.

239 DIFFERENT Worldwide, Only 25c! Includes Poland, Malagasy, Macao, Quemoy, Paraguay, Monaco, Antarctica, First Electronic Stamp, many others! Satisfaction guaranteed. Bargain approvals sent. Rush 25c for Lot EH-38. Zenith, 81 Willoughby, Brooklyn 1, N. Y.

EUROPEAN older mint stamps on approval. Hilson Tremere, Ormiston, Saskatchewan.

1897 NORTH Borneo—Mint fascinating Native Boat bicolor cataloging 60c—absolutely free to approval applicants. Viking, Great Neck 105, N. Y.

U.S. Stamps. Giant Bargain Catalog—20c. Raymax, 35VX Maiden Lane, New York City 38.

FREE 400 genuine postage stamps! Worth $10.00 at catalogue prices. Africa—Europe—Asia—British Emp.—a fascinating, valuable mixture from foreign convents, banks, etc. Who knows what you will find. Also free valuable Booklet. Adults only. Approvals enclosed. Frasek Co., PS, White Plains, N. Y.

FREE 100 different worldwide. Approvals. Hecht, Box 48, Goodrich, Mich.

50 DIFFERENT World stamps 15c. Drollinger, 103 SW 14th St., Deerfield, Florida.

FREE! 25 Egypt 5c handling. Approvals. Bellet Stamps, Hazel Park, Michigan.

21,000 DIFFERENT stamps, yours for only pennies a day on our systematic payment plan. Details free. W. Sjoquist, 1435 Cherrydale, San Jose 25, Calif.

500 MIXED World Big Variety 25c. Monjar, Fairmount, Cincinnati 14, Ohio.



Copyrighted material

60 DIFFERENT U.S. (30 Commemoratives) 25c. No approvals. Seidenberg, Appleton, Wis.

GIANT Approvals Thousands Different 1c and 2c each. Wahl's Stamp Exchange, 7008K Farragut, Chicago 31, Ill.

ENORMOUS variety old U.S. flags, famous Americans, Commemoratives with approvals, surprise packet, 10c handling. Metropolitan Stamps, Box 312 PS, Jackson Heights 72, N. Y.

PENNY Approvals jammed with Bargains. For better values, try Putnam Stamp Company, Mahopac, New York.

UNITED Nations: 1960 souvenir sheets—scarce $1.50 (Ten: $12.95). Ivy Stamps, 868 Broad St., Teaneck, New Jersey.

300 DIFFERENT Given Free with approvals. Particulars. Windsor Stamps, P.O. Box 735, Santa Clara, California.

1500 STAMPS $1.00 On and off paper. Good variety. World wide. Many pictorials. No approvals follow. Satisfaction guaranteed. Whalen, 1435 First Ave., Oakland 6, Calif.

FREE—Everytime you buy our exciting approvals, you receive Absolutely Free stamps equalling your purchase. West Coast Stamps, Santa Ana, California.

U.S. Mint Flag set, complete, $1.00. Free list. Brooks,2323-T Avenue X, Brooklyn 35, New York.

FREE—Any volume Scott's International Albums, Scott's 1961 Catalogues, even Master Global Album free, when you buy our sensational foreign approvals. Bargain Stamps, Redlands 3, California.

FREE! Giant Bargain Catalog — New Edition listing thousands of bargains including U.S. and B.N.A. Stamps, packets, mixtures, albums, accessories and supplies; sent with beautiful approvals. Jamestown Stamps, Dept. E31PS, Jamestown, N. Y.

100 FOREIGN, 20 U.S. Commemoratives, 10c. Approvals. Weckerling, 806K Orange, Weslaco, Texas.

FREE! Exotic Mint Polynesian Hula Girl stamps! Giant bargain lists included with approvals. Aloha Stamps, 1019-PS Tarryall Drive, Dallas 24, Texas.

100 OLD U.S. Stamps between 1861 and 1935 $1.00. Rousch Stamps, 51 Chestnut, Mansfield, Ohio.

25 DIFFERENT Commemoratives 189 up 10c. U. S. Approvals. K & B, Box 70, Brooklyn 23, N. Y.

FREE Sample! Interesting, Informative, Illustrated. National Stamp News, Anderson, South Carolina.

WOW! 110 All Different Germany 10c Zeppelins, Semi-Postals, Airmails. High values, etc. Giant Catalog, bargain lists included with beautiful approvals. Jamestown Stamp, Dept. A31PS, Jamestown, N. Y.

TERRIFIC Value, Eight Complete Mint Sets 10c With Approvals. Beaties, 58 Glenagar, Islington, Ontario, Canada.

PENNY Approvals! Regardless Catalogue! Kloster, 4164—52nd Ct., San Diego 5, California.

BARGAIN! 100 Different Sweden. 25c! Inexpensive Approvals. Carling, 361-B, Howard City, Michigan.

FIFTY Famous men, Statesmen, patriots, pioneers, artists and explorers. Plus surprise free gift. Send dime today. Approvals. Robert Butler, Dept. PS-361, 2810 Enoch, Zion, Illinois.

FREE! When buying our exciting approvals we give valuable packets, albums, catalogues. Tru-Values, Box 2098, Santa Ana, California.

TRADE your duplicates toward our approvals! (Foreign only.) Complete information, 10c. Variety Stamps, Box 98-S, Newton Highlands 61, Massachusetts.

1076 DIFFERENT $1.00 with approvals. Klondike, 682 Jefferson, Elgin, Illinois.

151 DIFFERENT U.S. commemoratives $1.00. Carstamps, 739-B Ordway, Freeport, Illinois.

FREE! "Surprise" stamp packet. Approvals. Premiums. Dancer, B75-T17, Mansfield, Ohio.

TRIANGLES, topicals, old U.S., others. 60 different 5c. Lake, Box 922, Lake Charles 33, Louisiana.

UNITED States, Canada, British Colonies' Quality Approval Collections. Enclose 10c. Peterson, Box 31, St. Paul 2, Minn.

14,000 DIFFERENT! Amazing new plan builds your collection systematically, country by country. Only 50c weekly. Free details. L. G. Ware, Stepney 70, Conn.

BERLIN Baers free with approvals. Heitmueller, Box 322, Asbury Park, New Jersey.

1000 DIFFERENT $1.00 with approvals. Goldens, 6721 Eastwood, Philadelphia 49, Penna.

50 DIFFERENT Stamps Free with approvals. Beacon Stamps, Box 218a, Pompano Beach, Florida.

FRENCH Colonies—6 beautiful sets, 10c with approvals. Bennett, Candor 2, New York.

1000 DIFFERENT Worldwide. $1.00. With approvals only. Jacobsen, Crompond, New York.

TRIANGLE Collection — Twenty-Two Different, 10c. Approvals. Valley's, Box 414S, Spring Valley, California.

PRICE List U.S. Foreign No Approvals. Allen, 5000 Miami, St. Louis 9, Mo.

UNITED Nations. 15th Anniversary Sheet. With first day cancel, as commemorated by Russia. Free! While they last, with approvals. Philatelics, P-J, New Paltz, N. Y.

U.S. Mint Approvals. Kuehl, 3125 East K Street, Tacoma 4, Washington.

NUDES! Ten Undraped, Partially Draped People on Stamps. Two Dimes. Approvals. Stamp Farm, S1-32, Oxford, Wisc.

1000 FINE Mixed United States Stamps 25c. Wright's, Box 1122, Hagerstown, Maryland.

10c BRINGS you 51 different U.S. with fine U.S. approvals. Stamps, Kennebunk, Maine.

NINE different First Day Covers. $1.00. Joe Haines, 4282 Ross Ave., San Jose 24, California.

FINE U.S. Air Mails on approval. Wildes Stamp Co., Cape Porpoise, Maine.

SEND 10 to 100 stamps (unreturnable). 10c, stamped envelope. Receive equal number different stamps in swap. No approvals! Stamp Swapping Society, Box 273, Massapequa, N. Y.

## 29 ANTIQUES, RELICS & INDIAN GOODS

SELLING 100,000 ancient Arrowheads, Spearheads, Tomahawks, etc. List free. Lear's, Glenwood, Arkansas.

## 30 MINERALS & PRECIOUS STONES

NEW MEXICO. U.S. and Foreign minerals, lists 5c. Hartson, Winston 5, New Mexico.

ROCKHOUNDS—Gem Cutters—Jewelry Makers . . . new Free catalog—just off the press! Biggest supplier to hobbyists and craftsmen offers you tools, materials, equipment, introductory bargains and know-how. Free catalog . . . Write Grieger's, Dept. C-13, 1633 E. Walnut, Pasadena, California.

SIXTEEN Mounted Mineral Rocks From Area of $40,000,000. Magnetite Iron Mine —$1.00. Mineral Museum, Flat River 1, Missouri.

EARTH Science — Rockhounds National Magazine. Subscription $2.50. Sample 35c. Box 1357-PS, Chicago (90), Ill.

BEGINNERS Illustrated Catalog. Mineral collections, manuals, accessories. 25c. Mineral Lore, 3004 Park Avenue, San Bernardino 3, California.

18 COLORFUL and basic U.S. mineral specimens attractively boxed with descriptive folder $1.00 prepaid. Included free dinosaur bone pocket piece. Rock Haven Mineral Co., Dept. M61, Whitefield, N. H.

GEM Hunter's Trip. 45 rough precious stones from 22 countries; all cuttable, for $5. Labeled. Ruby, sapphire, emerald, etc. Free catalog. International Gem Corp., 15 Maiden Lane C, New York City 38.

HIGGENS' Gems Minerals catalogue—dime. 5730-SE Waymire, Milwaukie 22, Oregon.

DEVONIAN Fossil Corals. Five different specimens $1.00. Graham Laboratories, 424 Wellington Street, London, Canada.

KLONDIKE Gold Pans! with booklet "Where and How To Pan". Send $3.00 to Neale Supply Co., Lethbridge, Alberta, Canada.

FREE bargain gem list. Lapidary and silversmith catalog, 56 pages 25c. O'Brien's, 1116 N. Wilcox, Hollywood 38, Calif.

## 31 HOBBIES, COLLECTIONS

INVENTING can be an interesting and profitable hobby. Write for complete particulars. Institute of American Inventors, Dept. 30-E, 635-F St., N.W., Washington 4, D. C.

INTERESTING Hobbies, Crafts, Collections of every description! Fascinating articles from all over the world! Read about them in new "Treasure". Subscription, $4.00 yearly; single introductory copy, 50 cents. Send today to Treasure, "The Magazine for Hobbyists," Denville 8, New Jersey.

SOLDIERS—Over 1,000 sets. Including, Civil War, Romans, Knights, Napoleonic. Catalog #2—35c. Bussler, Box 107-E, Wollaston 70, Mass.

COLLECTORS Matchbook covers. 100 Different unused $1.00. Catalog 25c. Album $3.00. Charles Edelman, 1311-P East 84, Cleveland 3, Ohio.

WANTED — Cigarette, tobacco cards. Write Charles Bray, East Bangor, Pennsylvania.

## 32 PHOTO FINISHING, PHOTOCOPIES, ETC.

A Triple Value—Quality, Price, Service, Color or Black & White. 12 exp. (Black & White)—59c. 20 Gift Photos—$1.00. Holiday Photos, Dept. 17, Box 666, Denver, Colo.

TWELVE Exposure rolls 49c. Wallets 20 for $1.00. Lincoln Studios, Dept. L, Box 13, Lincoln, Nebr.

A 3-in-1 Value—Price, Quality, Service. 20 Gift Photos—$1.00. 12 exposure rolls (Black & White)—59c. Color or Black & White. Interstate Photos, Dept. 12, Box 15, Aurora, Ill.

INTRODUCTORY Special, Processing Kodachrome 8mm movie or 35mm 20 exp. $1.00. Kodacolor 8 exp. complete $2.00; 12 exp. $3.00. Black and white 8 jumbos 40c. Jumbo reprints 5c. Quality guaranteed. Prompt service. Write for free mailers. Fast-X-Foto, Dept. PS-3, Box 7A, Jersey City, N. J.

ROLL Developed 4x6 or 4x4 prints, 8 exposure 50c; 12, 70c. 5x7 prints: 8, $1.00; 12, $1.40. Hagner, 1318 West Columbia, Philadelphia 22, Pennsylvania.

ENLARGEMENTS! Eight 5x7's or Five 8x10's from negatives, $1.00. Wilart, Box 975, Little Rock, Ark.

BEAUTIFULLY tinted 8x10 enlargement, favorite photo $1.00. 3 alike $2.00. Dick's Photo, Louisville 12, Ky.

## 32A COLOR PHOTO FINISHING

KODACHROME-Ektachrome Guaranteed Kodak Processing-Prompt-8mm or 35mm 20 exp. $1.40. Free List-Mailers Color Pix, Dept. S, CPO Box 30, Kingston, N. Y.

FREE Kodak Film Kodacolor or Black & White. Satisfaction Guaranteed. Send $1.00 for details. Film, Box 882c, Edinburg, Texas.

## 33 MOTION PICTURES & COLOR SLIDES

WORLD'S Largest selection of 8mm silent and sound films at discount prices. New and used—features and shorts from Castle, Official, AAP, NTA, etc., including "Old Time Movies", "Collectors Items." New 8mm magnetic sound films available. Free Bargain Bulletin (specify size) write to Peerless Camera Stores, 415 Lexington Avenue, New York. Dept. S18.

MOVIE Camera Film 8 mm roll $1.50. 16mm 100' $3.00. Free processing. Better Films, 742 New Lots, Brooklyn, N. Y.

MOVIE Film! Free catalog! Eso-H, 47th Holly, Kansas City 12, Mo.

FREE every month—Blackhawk's newspaper-size catalog 8mm, 16mm movies, 2"x2" color slides. Biggest selection in USA. Bargains in used 16mm sound films, projectors. Blackhawk Films, Davenport 15, Iowa.

USED 16MM Sound Projectors, also sound films, rental, sale, exchange. Write for free catalog. National Cinema, 71 Dey Street, New York City.



Copyrighted material

8MM-16MM Color And B&W film and supplies. Save $$$! Free Catalog. Superior, 442-448 N. Wells. Chicago 10.

16MM Sound shorts. Tremendous assortment of features. $16.50 up. Used 16MM sound projectors, $79.50 up. Free Catalog. Abbe Films, 417 West 44th Street, New York 36, Plaza 7-2219.

SEE the World in Color. 8mm—16mm. Kodachrome movies. Alaska, Hawaii, America, Europe, Africa, South Seas. U.S. National Parks. Also War and Rocket Test films. 185 subjects. Low prices. Write World in Color, Box 392-PS, Elmira, N. Y.

DISCOUNTS on Kodak films. Free price list. Thrifty Camera Co., Box 1022C, Saginaw, Michigan.

8MM—16MM Movie Films; Black and White; Kodachrome—Silent; sound. Approximately 500 wonderful subjects including unusual "Castle" Editions! Free Catalog! Griffin, 322-SP, West State, Ithaca, New York.

FREE Catalogues. 5,000 8-16MM Films. International Films, Greenvale, New York.

SPECIAL Entertainment—8mm, b&w, 50 feet $12.00. 16mm, b&w, 100 feet $20.00. Tex, Box 368, Terminal A, Toronto, Canada.

## 34 CAMERAS, PHOTO SUPPLIES

PHOTOGRAPHY for pleasure or profit. Learn at home. Practical basic training. Long established school. Free booklet. American School of Photography, 835 Diversey Parkway, Dept. 1723, Chicago 14.

164-PAGE Photographic Bargain Catalog, listing thousands of photographic bargains. Send 10c for your copy, receive 25c credit on first order. Dept. 4-E3, Central Camera Company, 230 So. Wabash Avenue, Chicago 4, Illinois.

## 35 MUSICAL INSTRUMENTS AND SONG WRITERS

SONGS Into $$$$$$$—Share $33 million dollars yearly for New Songwriters, Songpoets. Any subject, songs composed, published, promoted by largest firm. Information, appraisals Free. Send Nordyke Music Publishers, 6000 Sunset, Hollywood 28PS, California.

POEMS Wanted for musical setting and recording. Send poems. Free examination. Crown Music Company, 49-P West 32 Street, New York 1.

GUITAR Making, books, plans, imported woods, tools. List 10c. Wildwood, 510 East 11th Street, New York 9, N. Y.

SONGWRITERS: Recording Company Wants new songs. Royalty basis. National sales, promotion if selected. No charge for melodies. Send material. Music Makers, Dept. G-69, 8244 Melrose, Hollywood, California.

POEMS Needed Immediately for New Songs and Records. Free Examination and Appraisal. Send Poems: Songcrafters, Acklen Station, Nashville, Tenn.

SONGWRITERS, with publisher contacts, want song ideas. Share royalties. No fees. Send poems: Songwriters' Associates, 1650 Broadway, New York 19-F.

SONGPOEMS and songs wanted! Mail to: Tin Pan Alley, Inc., Box 405, Radio City Station, New York 19, N. Y.

SONGWRITERS, write for correct procedure. Send sample of your writing. In Business 23 Years! Song Service, Dept. PS, 333 W. 56th, New York 19.

ACCORDIONS—Guitars—Chord Organs! Save to ½. Famous makes. Direct Importer-Wholesaler Prices. Free home trial. Easy terms, trades. Mention instrument. Free catalogs. International Music Mart, Dept. P, 754 N. Damen, Chicago 22, Illinois.

LEARN Musical Instrument of your choice—easy! New home study tape course. Write for free brochure. Carver School, Box 366-AA, Palos Heights, Ill.

LEARN Your Chords Simplified. Details 10c. Teachers Plan Dollar. Echo, 1863 Southwest 65th Ave., Miami, Fla.

PIANO Tuning—Home Study Course. Diploma granted. American School of Tuning, Box 707, Gilroy, Calif.

ELECTRIC Guitars, amplifiers, wholesale. Free catalog. Carvin, PSM, Covina, California.

POEMS Wanted for musical setting and recording by America's Largest Song Studio. Send poems. Free examination. Five Star Music Masters, 646 Beacon Bldg., Boston.

## 35A PHONOGRAPH RECORDS

RECORDS—Stereo, Monaural. Big Discounts. Noelsson, Box 211, New York 5, N. Y.

THE Record Collector Journal, valuable data, sales mart. Introductory six issues, $1.00. Record Research, 131 Hart, Brooklyn 6, New York.

## 36 RADIO, TELEVISION, ELECTRONICS, HI-FI

FREE! Giant wholesale catalog on electronics, hi-fi, transistor, scientific, hobby, optics, photographic, housewares, jewelry, tools, novelties, toys. Write: Lektron, 241S Everett Ave., Chelsea 50, Mass.

RADIO & TV Tubes at Manufacturers Prices! 100% Guaranteed! Brand New! No re-brands or pulls! United Radio, Box 1000, Newark, New Jersey.

FIX Your Own TV, Save 80%! Send for Free Illustrated Chart showing how! We'll include Giant Electronics Catalog. Zalytron, 220-S West 42nd Street, NYC.

DON'T Buy HI-Fi Components, Kits, Tape, Tape Recorders until you get our low, low return mail quotes. "We Guarantee Not To Be Undersold." Wholesale Catalog Free. Hi-Fidelity Center, 1797S First Avenue, New York 28, New York.

TAPE recorders, Hi-Fi components, Sleep Learning Equipment, tapes. Unusual values. Free Catalog. Dressner, 1523 Jericho Tpke., New Hyde Park, New York.

HI-FI Components, Recorders. Free Wholesale Catalogue. Carston, 125-J East 88, N.Y.C. 28.

TAPES, Recorders, Phonographs, Radios. Free wholesale catalog! Towers, Box 3022, Philadelphia 50.

FREE! 1961 Catalogs for newest, best electronic bargains available. Stereo, hi-fi, ham radio, 1000 other items. Alco Electronics, Lawrence 3, Mass.

FREE 444-Page 1961 Allied Electronics Catalog! See products and values available only from Allied. See everything in Stereo hi-fi systems and components; latest money-saving build-your-own Knight-Kits; tape recorders, TV accessories; Public Address systems; world's largest stocks of parts, tubes, transistors, test instruments, tools, books. Only $2 down on orders up to $50. Write for value-packed Free catalog! Allied Radio, 100 N. Western Ave., Dept. 112-C1, Chicago 80, Ill.

RADIO & TV Tubes At Wholesale Prices. Tube Sales Company, Box 983, New Castle, Penna.

RADIO Course only $15.95 up. Build 10 radio circuits at home with the Progressive Radio "Edu-Kit," only $15.95 complete; 15 circuits $19.95; 16 circuits $22.95; 20 circuits $26.95; 30 circuits $30.95. Each course includes all tubes, parts, tools, instructions. Order direct from ad, or write for full information. Progressive "Edu-Kits" Inc., Dept. 564A, Hewlett, N. Y.

SAVE On Citizens Radio Dealer Discounts—Write Promotion Engineering, Box 84, Waseca, Minnesota.

KITS, Shortwave Radio $3.50; Crystal Radio 75c. Alliance, 2059—60th, Brooklyn 4, New York.

CRYSTAL Radio Kit $1.00 Amplifier and Speaker for same. $6.95. Catalog. Clearco Crystal Company, 2966 No. 4th, Milwaukee 12, Wisconsin.

## 37 BUSINESS OPPORTUNITIES

MAIL Order Dealers: Make 100% profit by selling successful publicized Italian Cook Book. Write for details. Di Fiore, 3009A 35th Ave., Long Island City 6, N. Y.

YOUR Own Import Mail Order Business! Deal with over 400 manufacturers, exporters of the world. Complete Import procedures, international drop-ship methods. Capital unnecessary. Free details. Associated, Box 2758-R8, Sioux City 6, Iowa.

MAKE Extra Money—Big Cash Commissions plus premiums for you and your customers. Sell Advertising Book Matches —sensational new Tenorama, Glamour Girls, Hillbillies; dozens others. All sizes —Quick daily sales; big repeat business. Free Master Kit makes selling easy—no experience necessary. Superior Match, Dept. PX-361, 7530 Greenwood, Chicago 19, Illinois.

$250.00 WEEK spare time profit possible. Earn at home with new fascinating Printing method. $5 starts you—send no money now. Free Confidential Facts and Valuable sample. Screen-Print, MH, Los Angeles 61,

BRONZE Baby Shoes: Instructions, Equipment and Mountings for genuine Electroplating Process. Largest Supplier of all Plating Equipment, Supplies. Free Catalog. Hollywood Bronze Supply, Dept. B-1, 1624 East First, Los Angeles 33, California.

FREE! Name Brands Catalog! Your own high profit business. Sell Name Brands, full or part time. No inventory—no investment. More than 2000 Name Brand items; lowest wholesale prices. Watches, jewelry, cameras, hi-fi, stereo radios-phonos, appliances, housewares, hardware, power tools, luggage, musical instruments, garden equipment, sporting goods, toys, many others. 8 Floors of Name Brands. Million dollar inventory. Orders shipped complete within 24 hours. Send for Free beautifully illustrated catalog. Now! Separate wholesale price list. H. B. Davis Corp., Dept. 14, 145 West 15 St., New York 11, N. Y.

FREE Picture Folder, "How to Make $3,000, Yearly, Sparetime, Backyard, Raising Earthworms!" Oakhaven-42, Cedar Hill, Texas.

OPERATE profitable mail order business. Write Walter Service, 4159-B East 112th, Cleveland 5, Ohio.

$3.00 HOUR—home, sparetime, assembling pump lamps. Easy. Free Details. Ougor, Caldwell, Arkansas.

FREE Literature — Make Big Money Raising Fishworms and Crickets. Carter Farm, Plains, Georgia.

BUY Direct From Factories—Appliances, Cameras, Watches! Free details! Cam Company, 6819PS-20th Ave., Brooklyn 4, New York.

IMMEDIATE Profits with no capital or experience. Take orders for all magazine subscriptions. Friends and neighbors are your prospects. Write now for complete free kit. McGregor Magazine Agency, Dept. 119B, Mount Morris, Illinois.

EXCEPTIONALLY profitable opportunity in Tape Recording! Free Information. Baron's, Lynden, Washington.

PLATE Baby Shoes, Jewelry, Gifts, bronze and colored pearl. We finance. Free booklet. Williamson 11029 South Vermont, Los Angeles 44.

$1.00 BRINGS You $18.00 Spare-Full Time Home-Business opportunity! Amazing new velvet-spray transforms old ¢¢¢¢¢ lamps, TV-radios, figurines, furniture—anything—into $$$$$ products! Free samples, 50 Business Opportunities Booklet. Send No Money. Flok-Kraft, MH, Los Angeles 61.

IMPORT-Export opportunity, profitable world-wide, mail-order business from home, without capital, or travel abroad. Established world trader ships instruction for no-risk examination. Experience unnecessary. Free details. Mellinger, T693, Los Angeles 24.

$70 WEEKLY—Home, spare time. Simplified mail bookkeeping. Immediate income—easy! Auditax, 34757D, Los Angeles 34.

INCREDIBLE New "Table-Top" Machine manufactures over 15,000 saleable products. Also laminates, encases, molds and plates in bronze, chrome, or copper. 20c materials produce $10.00 products. Free Confidential Details and Home-Business Plan. Plasti-Form, Dept. PS-3, Gardena, Calif.

NEW Home-Import Mail Order Profitunity! Your mailbox stuffed with money! No selling. No experience. No investment. We supply everything. Free Details. Mail Order Distributors, (Import Division) Dept. 63, 15201 South Broadway, Los Angeles 2, Calif.

INVISIBLE Reweaving: $5-$10 per job possible reweaving burns, tears, mothholes. Spare-full time. Free details. Skil-Weave, Dept. RC-133, 335 W. Madison, Chicago 6, Illinois.

MAKE fabulous weekly profits clipping newspaper items for publishers. Some clippings worth $5.00 each. Particulars free. National, 81-PS, Knickerbocker Station, New York City.

MONEYMAKING franchise can be exclusively yours. For free current franchise reviews information write Franchise Newsletter, G-9 South Clinton, Chicago 6.

IMPORT-Export. 20 lines offered. Substantial income opportunity. Individual setup service; not just instructions. Hermes, 152 West 42, New York City 36.





Copyrighted material

FREE Report "609 Odd, Successful Businesses." Box 1001-H, Evanston, Ill.

DOLLS! Dolls! Dolls! We teach you to repair, make, sell all kinds of dolls and accessories including clothing. Study at home. Earn while you learn. Free catalog. Doll Hospital School, Studio PSC-31, 11826 San Vicente Blvd., Los Angeles 49, Calif.

LEARN Professional TV Servicing in one week! Fabulous new simplified system. No big expense. No studying. No tools or equipment. Spare, full time. Own your own big profit business! Save! Amazing but true! Free! Write, TV Systems, Dept. EC-183, 1038 So. La Brea, Los Angeles 19, Calif.

GROW Orchids At Home. Profitable, fascinating. Successful Home grower explains special light, temperature and humidity conditions Orchids need. Free—full details plus 3-month Subscription to "Orchidian" magazine. Orchids, 100 S. Vermont, Los Angeles 4.

$100.00 WEEKLY spare room. Raise redworms soilless way. Odorless. Charlie Morgan, Box 116C, Bushnell, Florida.

MAKE durable building plastic easily. Waterproof, fireproof, economical. Bays Laboratory, Chinle, Arizona.

MONEY Making Acme Saw and Lawnmower Sharpeners. Finest made. Easiest and most Profitable to operate. Thousands of satisfied users. Terms. Free literature. Made and guaranteed by Max Manufacturing Co., 138 Stockton Ave., San Jose 26, Calif.

MAILORDER. Beginners plans. Free information. Armstrong's, 154 Darrington S.W., Washington 24, D. C.

EMPLOYED men! Make $40 extra weekly. Show friends "weatherproofed" Shoes, Boots. Your own shoes supplied without cost. Outfit free. Charles Chester Shoes, Dept. 3124, Brockton, Mass.

FRANCHISES make profits! Operate your own exclusive franchised business. Write today for free interesting details. National Franchise Reports, PS-528, 333 North Michigan, Chicago 1.

SELL Exclusive Imports, Wood Carvings, Brass, Copperware. Drewex, Narberth, Penna.

"HOW to Find a Moneymaking Product for Mailorder". $3.00. Keystone Research, Box 6-B, Garland, Texas.

AMERICA'S leading franchise firms are listed in the NFR 1961 Franchise Annual. Use it as your guide to franchise profits. Send one dollar today. National Franchise Reports, DS-528, 333 North Michigan, Chicago 1.

SELL Diamonite Gems: More Brilliant Than Diamonds. Credit Arranged. Catalog 10c. Diamonite, 2420-S 77th, Oakland 5, Calif.

MAIL Order schemes revealed; Reasons amateurs fail. Free details. MOS, 946 Washington, Denver 3, Colorado.

$200.00 MONTHLY. Spare Time. With Tablesaw, Bandsaw or Jigsaw. Write. Holiday House, B3800 Harney, Vancouver, Washington.

MARKETS Everywhere! Make Artistic concrete birdbaths, pottery. Best coloring. Home workshop. Hundred varieties. Free pictures. Hollywood Cementcraft, 8527-N Wonderland, Hollywood 46, California.

CANDIED Popcorn and Potato Chip Equipment. Eakins, Box 933-B1, Springfield, Ohio.

WANT Your Name with 1000 Mailers? 25c does it one year. Dixie Mailers, King, North Carolina.

SELL Books by mail. 400% profit. Royal, Box 368-M, Cleveland 27, Ohio.

VENDING Machines—No Selling. Operate A Route of Coin Machines And Earn Amazing Profits. 32-Page Catalog Free. Parkway Machine Corporation, Dept. 18, 715 Ensor Street, Baltimore 2, Maryland.

PLASTERCRAFT molds, liquid rubber, plasters, flocks, candle supplies. Catalog and manual free. Jayhawk Plasters, Blue Rapids, Kansas.

WANTED—Honest persons with legal, business, promotional experience, etc., to investigate and evaluate "the best proposition on earth" $500 for better proposition. Literature 25c. David Ornsteen, DuQuoin, Illinois.

EARN Good Money Sharpening Scissors, Saws, Tools, Cutters. Free Manual. Treyco, N. Tonawanda 1, N. Y.

SIMPLIFIED "Bookkeeping System" for mailorder beginners. $1.00. Neil H. Tasker, Shamokin, Pennsylvania.

MAKE fast selling children's item from scrap plywood. Jigsaw necessary. Details Free. Clifford Richards, Castalia, Ohio.

$200 WEEK, making signs. Sample signs, particulars, dime. Edward Cook, Martin Avenue, Saratoga Springs, New York.

EARN amazing profits from Novelty Woodwork! Our folio containing projects, patterns, instructions, "Easy Sales Methods," starts you at once! Only $2.00 postpaid. Carlton Dank, 1734 President Street, Brooklyn 13, New York.

$1,000 MONTHLY possible filling demand for bargain Broken Cookies. Your own business, big profits, fast turnover. Details $1.00. Cookies, P. O. Box 13423, Dallas 20, Texas.

SELL Champion, AC, Autolite spark plugs. Reconditioned, electroplated, guaranteed 10,000 miles. 100% profit. Free sample. Lee Plugs, 1608-K Roberts, Houston 3, Texas.

PIANO Tuning learned quickly at home. Tremendous field! Musical knowledge unnecessary. Information free. Empire School of Piano Tuning, Champaign, Illinois. (Founded 1935.)

OPERATE profitable mail order business. Write Welchel Limited, Black Mountain 32, North Carolina.

CASH from Sawdust, Tin-Cans, Newspapers. Over 200 methods. Instructions $1.00. Charles Company, 42-DPF, Norwood, Ohio.

MANUFACTURE Fishing Lures, None better. Start now, send $3.50—25 Samples complete. Quaker Lure Manufacturing Company, 3514-24 N. Lawrence, Phila. 40, Pa.

OPERATE home Mail-order Business. Vosacek Distributors, 4444PS Ute, San Diego 17, Calif.

FREE Fortunes with formulas, secrets, ideas, mysteries, business opportunities. Send post card. Unger Co., Box 8156, Pittsburgh 17, Penna.

FREE Book "990 Successful, Little-Known Businesses." Work home! Plymouth-452W, Brooklyn 4, New York.

MOTEL-Resort Management — Qualify for hundreds fascinating, leisurely, well paid executive openings. Learn at home. Free booklet. Motel Managers Training School, PS-C, 612 S. Serrano, Los Angeles 5.

RETIRE now with profits from a tape recorder. Free details. The Davella Recording Co., Spring Arbor, Michigan.

OPPORTUNITY to earn $15,000-$30,000 annually. Franchise protected. Granted on $12,500 basis. Live at home. No merchandise to buy. Selfemployed. One of most exclusive and noncompetitive Businesses in United States and Canada. Send for free explanatory booklet. Harrell and Company, Box 8-D, Louisville, Illinois.

FREE Book Offer, How I made over $40,000.00 year on $100. Investment, selling by mail. Torrey, Box 3566-F, Oklahoma City 6, Oklahoma.

LIQUID Molding Rubber, Free Sample. Shellcraft Supplies, Chaney's, 1907-C East Road, Jacksonville 11, Fla.

I retired at 47 operating simple plan—home! Get fascinating "Profit March 1935 To 1968". "Little Known Way To Lifetime Profits." Haylings, Carlsbad, Calif.

RE-Cast junk batteries into new. Latest achievements. Battery Laboratories, Bayou LaBatre, Alabama.

MAKE Figurines. Rubber for Molds, Extra Thick. Free sample. W. Wooley, 2801-B Latrobe, Peoria, Ill.

BIG Money—Exotic Imports sell on sight—Free Details. Davis, 1204D Alamo, Anaheim, Calif.

FOREIGN, U.S. Homesteads Available. Oil, Mining, Timber Concessions Information. Send $2.00. International Development News, Box 601, Catalina Island, Calif.

$75.00 WEEKLY possible mailing catalogs. Roe, 2317M Marshall, Chicago 23, Ill.

LOWEST priced bronzed baby shoe mountings! Forester, 1520 Ardmore, Chicago 26.

BAKE New Greaseless Doughnuts In Kitchen. Sell stores. Free recipes. Summers. 3605 South 15th, Minneapolis 7, Minnesota.

MAKE $46 From Square Foot Plywood; Jigsaw necessary. Free Details. Woodarts, Bridgewater, Mass.

COLORGLAZED Concrete pottery made without molds. Patented method. Cemetery products, novelties, tiles. Basement leak-sealing. Money-making projects. Booklet, details free. Men only. National Potteries, Grand Rapids, "Minnesota."

FREE, Unusual moneymaking newsletter reporting amazing income ideas. File B, Box 76254, Los Angeles 5.

## 38 MONEYMAKING OPPORTUNITIES

FREE Literature — Make Big Money Raising Fishworms and Crickets. Carter Farm-11, Plains, Ga.

START Big-Pay business at home in spare time. No experience needed to operate little table-top machine for bronzing baby shoes. Make $5.46 profit on every pair. Full particulars free. Send postcard to Mason, 1512 Jarvis, Room CM-3-A, Chicago 26, Illinois.

DETECTIVES—Work home—Travel. Experience unnecessary. Detective Particulars free. Write Wagoner, P-125 West 86th, New York 24.

EASY to start rubber stamp business at home in spare time. Make up to $9.80 an hour without experience. Facts free. Write to Roberts, 1512 Jarvis, Room CR-3-A, Chicago 26.

MAKE fabulous weekly profits clipping newspaper items for publishers. Some clippings worth $5.00 each. Particulars free. National, 81-PS, Knickerbocker Station, New York City.

MEN — Women! Start Money-Making Plastic Laminating Business at home in spare time. Material that costs 11c brings back $2.58. No canvassing or selling but mail orders bring in $20 a day. Write for full particulars free. Rush name on postcard to Warner, Room CL-3-A, 1512 Jarvis, Chicago 26, Ill.

EARN Extra Money Now. Take orders for all magazine subscriptions. Friends and neighbors are your prospects. For new profits and pleasure, write today for complete, free kit. McGregor Magazine Agency, Dept. 110M, Mount Morris, Illinois.

EASY to Earn Extra Money! Free 100 page Catalog. Tandy Leather Company, Box 791, A40, Fort Worth, Texas.

MAKE Money Writing Short Paragraphs! No tedious study. I tell you what to write, where and how to sell; and supply list of editors buying from beginners. Many small checks add up quickly. Write to sell right away. Send for free facts. Benson Barrett, Dept. C-86A-A, 7464 Clark, Chicago 26.

MINK Raising information free. Complete. Lake Superior Mink Farm, Superior EE, Wisconsin.

MAIL Trade Magazine Has Moneymaking opportunities galore. Sample 25c. Donovan, 79-PS Greenbelt, Levittown, New York.

WANTED! Men wanting to make money in spare time, write Taylor Enterprises, Export, Penna.

A Second Income From Oil Can End Your Toil! Free Booklet And Oilfield Maps. No Obligation. National Petroleum, PanAmerican Bank Building-PS, Miami 32, Florida.

MAKE Money clipping newspapers. Write Bonco, 130 Cumberland Ave., Masontown, Penna.

LEARN my moneymaking secret. $1.00. Wm. E. Botkin, Muncie, Indiana.

AMAZING successes through franchises! Become exclusive franchise holder your territory. Information rushed. National Franchise Reports, SP-528, 333 North Michigan, Chicago 1.

900% PROFIT! Fast sellers by mail. Write: MOS, 946 Washington, Denver 3, Colorado.

ALUMINUM Awnings Wholesale Factory Prices! Sell! Write Jack, Box 10254, Tampa, Florida.

WOMEN, Men $500 Monthly possible spare time at home with little capital. Start Correspondence Club. Send $1 for complete plans. Hollywood Service, Box 47704A, Los Angeles 47.



Copyrighted material

VENDING Machine—No Selling. Operate A Route of Coin Machines And Earn Amazing Profits. 32-Page Catalog Free. Parkway Machine Corporation, Dept. 19, 715 Ensor Street, Baltimore 2, Maryland.

TYPING—Home, sparetime. Refundable money-making instructions 50c. Interstate, 37-9 Besch, Albany 9, N. Y.

CREATE Original glazed tiles for your patio, porch, pool area or sell to others—without machinery. Complete instructions—$1.00. DeBacco Tiles Co., Box 7117, Euclid Station, St. Petersburg 34, Fla.

IMPORTED and general merchandise. Distributors prices. Wright Imports, Matthews, North Carolina.

OPERATE Profitable Mailorder Business. Write Gilbert Risden, 2459 Denton, Hamtramck 12, Mich.

NOW, cash in on the 900 Calorie Diet Boom. Easily made at home for pennies. Big markup. Details $1.00. Diet, P. O. Box 13423, Dallas 20, Texas.

MAKE $200.00 monthly spare time with jigsaw. Free details. Elkman, 346 N. Summit, Sioux Falls, So. Dakota.

RETIRE now with profits from a tape recorder. Free details. The Davella Recording Co., Spring Arbor, Michigan.

$50,000 YEARLY Possible. Distribute sales literature your territory. Write Afja, Box 33-C, Southfield, Michigan.

FREE! Succeed in Mail Order. Guaranteed! Mailord Company, Dept. 361-B, Southampton, New York.

BIG Mail order profits laminating clippings, photos I.Ds, documents, without heat, press glue. Permanent Seelux instant self-sealing plastic sheets. Details, generous sample 25c; $5.00 value trial only $1.00. Utility Products, Cincinnati 2, Ohio.

CIGARETTES—Make 20 plain or filter-tip for 9c. Facts free. Moberly, Box 4013, Owensboro, Kentucky.

PROFITABLE spare time business. Information Folio $2.00. Epsco, 59 Beverly Drive, Springfield, Illinois.

FREE directory where to buy 800,000 articles direct from manufacturers. Glass, Wampum 1, Penna.

## 38A BUY IT WHOLESALE

LARGEST Wholesale Supply Source in U.S. Get free catalogs. Furniture, clothing, appliances, autos and accessories, farm equipment, tools, housewares, hobby supplies. Free details. Associated Wholesalers, Box 2758-C, Sioux City 6, Iowa.

NEW Deluxe Multicolor below wholesale catalog, automobile catalog, and others. Housewares, appliances, refrigerators, freezers, washers, dryers, television, radios, furniture, clothing, luggage, binoculars, phonographs, recorders, cameras, projectors, tools, typewriters, watches, jewelry. Name brands. Huge discounts to 70%. Postcard: Selbyco, Decatur 16, Illinois.

FREE Money-Saving Catalog. Surplus and newly manufactured equipment and tools for workshop, home, boats, farm, factory. Write: Groban, 1139 South Wabash, Chicago 5, Illinois.

MERCHANDISE Wholesale. Tape Recorder. $39.95! Catalogs 50c (Doubly Deductible). William Kay Sales, 130 Leopold Blvd., Syracuse 9, N. Y.

2000 NAME Brand Items. Discounts up to 50%. Catalog $1.00 (Refundable). Mynor's, 400 South Main, Suffolk, Virginia.

WORLD'S Largest wholesale supply. Buy from 679 American, European, Japanese wholesalers. Tailormade suits from Hongkong. 123 dropship catalogs. Rockbottom prices. Free details. International Buyers, 216-PS Jackson, Chicago 6, Illinois.

ELECTRIC Guitars, amplifiers, wholesale. Free Catalog. Carvin, PSW, Covina, California.

FREE Catalog. Lowest priced catalog house U.S.A. Send $1.00 refunded on $7.50 purchase. All merchandise guaranteed. Fanning's, 230 Arleta Avenue, San Francisco 24, Calif.

FREE Wholesale Catalog! Huge Discounts. Singleton, Box 77-S, Newport, Ky.

2,000 PAGES Wholesale Catalogs! Write: Mosaser, Box 47-A, Newark, Ohio.

THOUSANDS Bargain Basement Offers Wholesale. Rush 35c Requesting Mums Catalog. JR Associated, 209 West Jackson Parkway, S 409, Chicago, Ill.

100,000 PRODUCTS Wholesale! Terrific Bargains! United Wholesalers, 1265 Broadway, New York 1, N. Y.

WHOLESALE Catalogue! Appliances, cameras, watches! Associated Distributors, Box 1481-A, Denver 1, Colorado.

## 38B IMPORT-EXPORT

CATALOG of genuine Imported Merchandise. Hardware — Novelties — Toys. Free Copies. Lawrence, 116-33-142nd Street, Jamaica 36, New York.

KNIVES, field glasses, etc. Distributors prices. Wright Imports, Matthews, N. C.

## 39 FORMULAS, PLANS, ETC.

FORMULAS—Superior, high quality, ultra-modern developments of advanced chemical science. Our formulas are used by many of America's largest corporations. Write for free offer and proof. Burmar Chemicals Inc., 284 4th Ave., Brooklyn 15, N. Y.

FORMULAS of all kinds, receipts and processing of valuable items. Catalog free. Chemist, Box 522, Columbia, Missouri.

FORMULAS—All Kinds. Amazing Big Catalog 10c. Kemisco, Park Ridge 15, Illinois.

LATE Modern Manufacturing Formulas List Free. Chemical Service, Martville, New York.

SPECIAL Formulas for latest money-making discoveries. New! Good! Profitable! Valuable Literature Free! Miller, Chemist, 1517-N, Tampa, Florida.

## 40 PLASTICS

NEW Liquid casting plastic, clear, colors. Embed real flowers, butterflies, photos, coins. Send 25c for two handbooks "How to Cast Liquid Plastics" and "How to Make Extra Money at Home." Castolite, Dept. C-102, Woodstock, Illinois.

MAKE your own plastic jewelry, castings and embeddings. Introductory Jewelry Kit $3.95 or send 25c for catalog. Castacraft Corp., Dept. S-361, Box 555, Palo Alto, Calif.

NEW!! Electric Plastic Laminating Kit. Hobby. Fun. Profitable. Details. Burr, 330 East Centre, Kalamazoo, Michigan.

PLEXIGLAS — Any thickness — Clear —Colors—Cut to size—Clear Rods—Tubing. McClarin Plastics, P.O. Box 168B, Hanover, Pennsylvania.

CELLULOID scrap. Sheets, state thickness, colors, Box 333, Kearney, New Jersey.

PLASTIC Embedding for fun and profit, no oven. Make beautiful jewelry, decorative panels, science specimen castings. Catalog 25c. Natcol Plastics, Box 444, Yucaipa 4, California.

## 41 SCIENCE & CHEMISTRY

AMAZING New Book Of Science Experiments, formulas and Catalogue of Laboratory Supplies. Only 35c. National Scientific Co., Dept. PS-3, 13 S. Park Avenue, Lombard, Illinois.

MICROSCOPE slides, anatomical. Free list. Bay, 409 Roosevelt, San Francisco 14, California.

232 PAGE Catalog $2.00. Laboratory Materials, 7319 Vincennes, Chicago, Illinois.

UNUSUAL Chemistry books, courses, kits! Rare chemicals, cheap! Catalog 25c. National, Box 133-A, Palo Alto, Calif.

EXPERIMENTERS: — Searching For Economically Priced Chemicals and Apparatus? Get Our Catalogue—25c. Starr Scientific, Manitowoc, Wisconsin.

CHEMICALS and apparatus for industrial, analytical and private laboratories. Catalog 25c. Dept. M-26, Biological Supply Co., 1176 Mt. Hope Ave., Rochester 20, N.Y.

SPECTACULAR! Laboratory Supplies Catalogue and "Experiments Booklet." Only—25c. Hagenow Laboratories, Manitowoc, Wisconsin.

LOW Prices on Chemicals and Apparatus. Send 15c for New Catalog. Xercon Scientific Co., 8542 Oglesby Ave., Chicago 17, Ill.

ROCKET Model kits, parts, chemicals. Catalog, plans 25c. Central Rocket Company, Waupaca, Wisconsin.

ILLUSTRATED Catalog; Chemistry, mineralogy, biology 25c. Tracey Laboratories, Evanston, Illinois.

COMPLETE Catalog 25c. Used equipment bargains! Laboratory Sales, Box 161-B, Brighton, Mass.

HIGH Vacuum Pump easily built without special tools. Complete plans, instructions, $1.00. Kits available. Graham Laboratories, 424 Wellington Street, London, Canada.

SPACE Science Enthusiasts. Bulletin 10c. A. L., 471 Clifton Avenue, Newark 4, N. J.

MICROSCOPES, Radios, Surverying, everything Japanese. Catalog 25c. Magnification Instrument, 2 E. 45, New York 17.

## 42 EMPLOYMENT INFORMATION

FOREIGN Jobs—Latin America, Alaska, Canada, up to $1500 monthly. Up-to-date 1961 Foreign Service Directory gives complete information, hot list of firms hiring for Military and Civilian Construction, Aircraft, Oil, Exporters-Importers, Mining How-When-Where to apply. 13th Successful year. $1.00. Global Reports, Box 8873-P, Los Angeles 8, California.

FOREIGN Employment Information. Work overseas. Travel, adventure. Europe, Africa, Asia, Canada, Alaska. Earn as much as $1,600 monthly. Construction men, truck drivers, clerks, teachers, professionals, etc. Fabulous opportunities. Most complete information, application blanks, etc. Sent by return mail same day received. Send $2.00 to Dept. PS, Foreign Bureau, P. O. Box 512, New Orleans, Louisiana.

JOBS: High pay. Foreign countries, USA. All trades. Write Dept. 55E, National Employment Information, 1020 Broad, Newark, N. J.

DIRECTORY Reports. Construction, aviation, shipping, oilfields, government, manufacturing, trucking, etc. Foreign-Stateside. Helpful information plus job-getting tips on preparing application letters. Unconditional money-back guarantee of satisfaction. Act Today. Only $2.00. ($2.25 Airmail) (C.O.D.'s Accepted) Research Services, Meramec Building, St. Louis 5-PS, Missouri.

HIGH Paying foreign jobs. Far East, Europe, South America, Jobs on ships and civil service. For Information, write to International Employment, P.O. Box 115, Boston 27, Mass.

CHOICE U.S. & Overseas Jobs. All Trades. Firms, Addresses, Hiring Procedures, Pay Scales, Benefits. For info. write: World Wide, Dept. C9, 149 N. Franklin St., Hempstead, N. Y.

MEN and women wanted. Work in your own homes for well-known company. Many different positions open. Age and education no barrier. Send resume plus one dollar to P.O. Box 653, Omaha, Nebr.

WORK in healthful Arizona. Information, Job listing, $1.00. Thompson Enterprises, Box 6561, Phoenix 5, Arizona.

MUSHROOMING Houston! Classifieds air mailed $2.00. Also letters remailed 50c. Remail Service, Box 8121, Houston 4, Texas.

JOB Openings—U.S.A. & worldwide. Thousands of good jobs in hundreds of categories. New Edition tells where & how to land job you want. Send $1.00 to Who's Hiring Who, 2020 "M" St. N.W., Dept. S, Washington 6, D. C.

WANT Civil Service Job? Get Best Available. Handbook Tells How. $1.50 Postpaid. Moneyback Guarantee. Edwards, 20 East Goethe, Chicago 10, Illinois.

OPPORTUNITIES In Washington. This informative booklet was compiled this year by our research department. A statewide survey giving actual wages paid in Aircraft — Mining — Construction — Lumbering — Agriculture and many other occupations. This publication gives facts, figures — living conditions and much valuable information to anyone seeking employment in this region. Enclose $3.00. Webster-Freeman Publications, Box 935, Spokane 1, Washington.

## 43 AGENTS WANTED

YOUR Own business—Suits $1.50; Overcoats 65c; Mackinaws 35c; Shoes 12½c; Ladies' Coats 30c; Dresses 15c. Enormous profits. Catalog Free. Nathan Portnoy Associates, 2109-J Roosevelt Road, Chicago 8, Ill.

MEN! Show wife this amazing offer! Famous nationally advertised Hollywood cosmetics pay 60%. Make $25 day up. Hire others. For free samples, details, write Studio Girl, Glendale, Calif. Dept. 1113T.





Copyrighted material

EVERY Man A Prospect. Refundable sales kit offer showing line belt buckles, tie clasps, money clips, cuff links, lapels, identification badges, individualized with customer's name and emblems. Cap badges for trucking, bus, taxi, police, firemen, also heavy construction emblems. Choice 3000 emblems. Hook-Fast, Box 1425PS, Providence, R. I.

START Making Money Now. Earn top commissions taking orders for all magazine subscriptions. Friends and neighbors are your prospects. No experience needed. Write for free money-making kit. McGregor Magazine Agency, Dept. 118A, Mount Morris, Illinois.

ANYONE can sell famous Hoover Uniforms for beauty shops, waitresses, nurses, doctors, others. Miracle fabrics Nylon, Dacron, Wash 'N Wear Cottons. Exclusive styles, top quality. Big income, real future. Equipment free. Hoover, Dept. C-101, New York 11, N. Y.

FREE! Beautiful Mexican curios! Send 14c stamps mailing. Sylvial, Apartado 9036, Mexico City.

WILL you wear new suits and topcoats without one penny cost and agree to show them to friends? You can make up to $40.00 in a day even in spare time, without canvassing. W. Z. Gibson, Inc., 500 S. Throop St., Dept. T-626, Chicago 7, Illinois.

WILL You test new items in your home? Surprisingly big pay. Latest conveniences for home, car. Send no money. Just your name. Kristee, 83, Akron, Ohio.

WANT to make $25.00 or more in day for part or full time route work? Man or woman. Write McNess Co., Freeport 25L, Ill.

FREE Details—New Transistor radio booster. Get more stations, distance. Use portable as auto radio. Sells for only $3.95. Deaver Co., 263 Whitelem Drive, Palo Alto, California.

TROPHIES, Sportswear, Lettering. High commissions. Season starts March 1st. Send resume, references. Pennington Trophies, 10932 S 71 Hwy., Kansas City 37, Mo.

JAPAN'S Finest. Exotic Earrings! Details Free. Ohga, PSER-238, Sigakenkusatu, Japan.

MAKE $55 A Day Clear Profit! Sell nationally advertised Royaltone Auto Glaze to car owners, dealers, jobbers. Exclusive territories. Rush name for free sample, details. Royaltone Co., Brooklyn 30, N. Y.

WEAR free shoes in 30 days! Make $25.00 cash besides! 10 shoe orders from friends qualifies you. Outfit free. Charles Chester Shoes, Dept. 3130, Brockton, Mass.

DIRECT Mailer. Drop shipment. Brochure free. Box A-33, Wantagh, New York.

BIG Profits—Stamp Social Security Plates Key Protectors. Sample—50c. Catalog Free. General Products, 11 No. Pearl St., Albany 7, N. Y.

$50.00 PROFIT selling "State Map Stationery." Free Details. Chegwidden, Box 182-PS3, Dover, New Jersey.

MAKE Profitable Men's-Women's wear. Sample Free. Sunmade, Brockton 64, Massachusetts.

BUSINESS of your own. Earning potential as high as $40,000 annually. Issued on $12,500 base. No merchandise to buy. Send for free explanatory booklet. Harrell & Company, Box 8-DD, Louisville, Ill.

CIGARETTE Ball Pen—looks like Real cigarette! Terrific seller, 2 for 25c. Rush $6.50 for 100, postpaid, or $1 for 12. Robbins, Box 315-P, Forest Hills, New York.

LONG Needed Invention. Men to contact filling stations. Huge profits. Cyclo Mfg. Co., 3816 Dahlia, Dept. 199, Denver 1, Colo.

## 44 HIGH-GRADE SALESMEN

MAKE Extra Money Selling advertising matchbooks. Free catalog and sales outfit. Matchcorp, Dept. PS-31, Chicago 32.

YOUR free copy of World's biggest sales magazine tells you how and where to make more money on your own in selling. Write Specialty Salesman Magazine, Desk 6B, 307 North Michigan, Chicago 1.

SEEKING New Products? Get my outfit 47 money-making specialties. Latest conveniences for home, car. Send no money. Just your name. Kristee 107, Akron, Ohio.

EARN Big Commission Full Or Part Time. Build profitable business of your own selling America's largest line low priced business printing. 360 page catalog samples hundred of items used daily by business people. Imprinted ball pens low as $8.95 for 100. Big full color catalog low priced advertising specialties included. Free sales kit. National Press, Dept. 9, North Chicago, Illinois.

MAKE Extra Money—Big Cash Commissions plus premiums for you and your customers. Sell Advertising Book Matches —sensational new Tenorama, Glamour Girls, Hillbillies; dozens others. All sizes—Quick daily sales; big repeat business. Free Master Kit makes selling easy—no experience necessary. Superior Match, Dept. P-361, 7530 Greenwood, Chicago 19, Ill.

GET New Shirt Outfit Free! $90 weekly on 5 average orders a day. Famous quality made-to-measure dress and sport shirts at $4.50 up, sell to all men. No experience needed. Full or part time. Write: Packard Shirt Co., Dept. 320, Terre Haute, Ind.

IF you're interested in making money in selling, see the hundreds of exceptional opportunities in Salesman's Opportunity Magazine. Send name for your copy, absolutely free. Tell us what you're selling now. Opportunity, 848 N. Dearborn, Dept. 18, Chicago 10, Illinois.

SENSATIONAL new longer-burning Light Bulb. Amazing Free Replacement Guarantee—never again buy light bulbs. No competition. Multi-million dollar market yours alone. Make small fortune even spare time. Incredibly quick sales. Free sales kit. Merlite (Bulb Div.), 114 E. 32nd, Dept. C-74C, New York 16.

$1,000.00 A month for making dramatic 3-second demonstration of amazing lightweight Presto Fire Extinguisher. New chemical used by Airforce snuffs out fires instantly. Only $4.95. Terrific commissions. Millions want it. Free Kit. Merlite, 114 E. 32nd, Dept. P66C, New York 16.

## 45 EDUCATIONAL & INSTRUCTION

LEARN By Ear With Dormiphone—Overnight—while you sleep and learn it Faster—Better. The amazing new scientific Dormiphone tools give you a shortcut to learning languages, correct speech; memorizing facts, figures; relaxation, entertaining, habit training. Saves you time, effort. So sifple to use, children benefit. Used by educators, psychologists. Write today for Fascinating Free Book. No obligation. Modernophone, Inc., 321-031 Radio City, New York 20.

LEARN While Asleep with your recorder, phonograph or amazing new "Electronic Educator" endless tape recorded. Details free. Research Association, Box 24-NN, Olympia, Washington.

HIGH School Diploma at home. Licensed teachers. Approved materials. Southern States Academy, Station E-12, Atlanta, Ga.

MASTER Watchmaking at home. Free sample lesson. Chicago School, 2328-WP Milwaukee, Chicago 47.

WANT a Diesel Job? Higher Pay? Advancement? We can help you qualify! Complete Diesel, Tractor and Heavy Equipment and Cummins Diesel Engine Shop-method home-training courses available. Write today. Interstate Training Service, Dept. B-2, Portland 12, Ore.

COMPLETE Your High School at home in spare time with 64-year-old school. Texts furnished. No classes. Diploma. Information booklet free. American School, Dept. X346, Drexel at 58th, Chicago 37, Illinois.

ENGINEERING and Art Degrees earned through home study. Electronics, Electrical, Mechanical, Civil, Physics, Liberal Arts. When writing, specify course desired. Pacific International College of Arts & Sciences, primarily a correspondence school. Resident classes also carried. 5719-A Santa Monica Boulevard, Hollywood 38, California.

LEARN Auctioneering. Free catalog. Missouri Auction School, Box 8466-X5, Kansas City, Missouri.

BECOME Tax Consultant. Graduates earn $1,000-$3,000 every tax season preparing returns evenings. State approved. Union Institute, Lakewood 1X, N. J.

LEARN Civil and criminal investigation at home. Earn steady, good pay. State age. Institute Applied Science, 1950 Sunnyside, Dept. 533, Chicago 40, Illinois.

PIANO Tuning Pays. Big money in spare time. Learn at home in 30 days. No musical knowledge necessary. Phonograph, records, tools and instructions furnished. Electronic tuning also taught. Free catalog. Capital Tuning School, 3160 S.W. 16th Court, Ft. Lauderdale, Fla.

GAME Warden, Government Hunter, Forestry, Park and wildlife service announce job openings regularly. Enjoy outdoor work, good pay, real security. Complete information Free! Write North American School of Conservation, Dept. 183B, 810 Dodsworth, Covina, Calif.

BE A Real Estate Broker, Insure Security for yourself and your family. Study at home. Prepare for state examination. GI approved. Write for Free Book Today. Weaver School of Real Estate, 2018R Grand, Kansas City, Missouri.

FREE L.P. Record and book gives instructive facts about Sleep-Education and the Audio Educator—the short cut method to learning and self-development. No obligation. SDRF, Dept. S-3, 104 East 40th Street, New York 6, N. Y.

GOOD paying jobs open! Operate, repair heavy earth moving equipment! Learn "on the job" operating latest cranes, bulldozers, earth carriers! V.A. Approved. Free Catalog. Write N.C. Hutch, Greer Technical Institute, Braidwood, Illinois.

DRAFTING Pays Big Money . . . leads to top positions in automotive, aeronautical, construction, mechanical fields. Learn at home in spare time. All equipment supplied. Pay Later Plan. Free Book. Christy Trades School, CD-401, 3214 Lawrence, Chicago 25.

USED Correspondence Courses and Books sold and rented. Money back guarantee. Catalog free. (Courses Bought.) Lee Mountain, Pisgah, Alabama.

BOOKKEEPERS — Operate Your Own "Dollar-A-Week" System. Ellis, Box 200, Cedar Grove, North Carolina.

ANALYZE Handwriting for profit, pleasure. Free sample lesson, catalog reveals plan. Write Igas, Inc., Dept. 2CN-1, Springfield 4, Missouri.

FREE General Catalog—100 Pages Text vocational, educational, instructional subjects. Millions of volumes, new and used Bargain prices. Books bought. Est. 1902 Long's College Book Co., Dept. PS, Columbus 1, Ohio.

ATTENTION! Bargain Art courses, drawing, painting, signs. Free Literature. Art Book Shop, Arnold 1, Missouri.

TRAIN in spare time for a profitable business of your own in Pest Control. Costs little more than a daily pack of cigarettes. 20 complete lesson course. Insect specimens, chemical samples, magnifying glass, business forms all furnished. Licensed by the State of Illinois. Write For Free Brochure. Elston School of Pest Control, 4674 Elston Avenue, Chicago 30, Illinois.

MONEY! Prestige! Analyze handwriting. Successful students. Cunningham, 81 Bailey, Lawrence, Mass.

STRENGTHEN Your Voice—For More success in business, social life! Free booklet. (Give age). PV Institute, 210 S. Clinton, Studio 2EN-1, Chicago 6.

DENTAL Technicians always in demand!! Send only $2.98 for "The Know How of Artificial Denture Construction". Ten complete chapters of fundamentals. Easy to understand. Illustrated, authentic, direct from a detal laboratory. Grant Laboratory, Haas Bldg., Los Angeles 14, Calif.

FINISH High School at home. No classes. Texts furnished. If 17 or over and left school, write for Free assignment and catalog. High School Division, LaSalle Extension University, A Correspondence Institution, 419 S. Dearborn, Dept. 383 WC, Chicago 5, Illinois.

LEARN Real Estate Business fast. Economical homestudy. Particulars Free. Howard Schools, 322 Glover, Kansas City 5, Missouri.

DRAW, understand schematics, blueprints. Send $2.00. Prior, 23-09 169 Street, Whitestone 57, New York.

OWN local collection office. Pays big. Franklin Credit, Roanoke, Virginia.

MEN wanted. Learn Auto-Diesel Mechanics in our shops. Learn with tools on real equipment. Earn While You Learn. Many of our graduates earn $125 a week and up. Write for free bulletin. Auto-Diesel College, Dept. 262, Nashville 3, Tenn.



Copyrighted material

MECHANICS! Auto—Diesel—Construction. Learn How, Your Area. Natrng, Box 7400, Washington 4, D. C.

LEARN how—pass civil service or educational tests with good score. Many helpful suggestions. Mail $1.00. Refundable. Universal, 150 Powell, San Francisco, Calif.

PENMANSHIP Corrector: Improve poor penmanship quickly. Details free. Ozment, Box 665 35, St. Louis, Mo.

MEMORIZING Amazingly Easy. New Simple Method Produces Results Immediately. Money Back Guarantee. Price $3.00. Memory Course, 500 Ninth Street S.W., Cedar Rapids, Iowa.

## 46 CONTESTS

WIN contest money. General Contest Bulletin gives hundreds of tips. Lists current contests, rules. Sample magazine 25c. General Contests, 1609-A East 5th, Duluth 12, Minnesota.

MONTHLY Puzzle contests: Cash Prizes! Spence, Box 11569, St. Petersburg, Fla.

CONTEST Information, Latest Contests. Send Dime. Guidebooks, Box 246, Decorah, Iowa.

## 47 DETECTIVES

DETECTIVE Training. Phillips Secret Service System, 1917-C North Kenneth, Chicago 39, Ill.

DETECTIVES—Work home—Travel. Experience unnecessary. Detective Particulars free. Write Wagoner, P-125 West 86th, New York 24.

DETECTIVE Profession. Home Study. Badge, Certificate, Future. 4563-G York, Los Angeles 41, Calif.

DETECTIVE Course. Credentials. Diploma. Free information. Southwestern Institute Criminology, 510-B Iowa. Geronimo, Oklahoma.

DETECTIVES, Undercover Operators, Security Officers—we train. Free information. Write AMCAD, Dept. A, 1951 Galt Street, Simi, California.

JOIN International Investigators Association. Worldwide membership. Details Free. Write Col. Hubley, 141 Bridge, Saint John N.B., Canada.

## 48 LANGUAGE OUTFITS

LEARN world interlanguage endorsed by Unesco. Free lesson. Esperanto, Middleton, Wisconsin.

## 50 BUSINESS SERVICE, INFORMATION, NAME LISTS

MAILING Lists—1000 names $5.00. Your circulars mailed 1000—$4.00. Free Literature. Dixie Mailers, King, N. C.

## 52 AUTHORS SERVICE

WANT Your Book Published? Learn how we publish, advertise, promote, distribute. Many successes. Free booklet PS, Vantage, 120 West 31, New York.

WRITERS!—Free sample copy of Pink Sheets listing top-notch markets of U.S.A. available to you upon request. Write today! Literary Agent Mead, 915 Broadway, New York 10. N. Y.

## 53 ADVERTISING, AGENCIES, ETC., FOR ADVERTISERS

FREE expert assistance for mailorder advertisers. Ratebook leading newspapers, magazines, 10c. Chicago Advertising Agency, 28 E. Jackson, Chicago 4.

ADVERTISE: 24 words, 100 Canadian Newspapers, $5.50. Lists Free. Advertising Bureau, 10511-P Springfield, Chicago 55.

FREE! Red-hot book, "More Profit From Your Advertising." Lists best Mail Order Magazine, Newspapers. Adservice, 516A Cornelia, Chicago 13.

## 54 CARTOONING, SIGN PAINTING, CHALK TALKS

"HOW to Make Money With Simple Cartoons"—A book everyone who likes to draw should have. It is free; no obligation. Simply address Cartoonists' Exchange, Dept. 193, Pleasant Hill, Ohio.

CARTOONERAMA Teaches you cartooning in a new 24 Lesson Course. Free Brochure. CFA, Box 263Z, Branford, Connecticut.

YOU can Entertain with Chalk Talks. Catalog 10c. Cartoonist Balda, Oshkosh, Wisconsin.

ART—Learn at home. Earn big money. Learn Commercial art, cartooning, lettering, figure drawing, painting, TV art, in spare time. All for 20c a day. Send for free book. No obligation. Washington School of Art, Studio 153, Port Washington, N. Y.

BOOKS plus optional assistance service. De-Signs, Box 2024PS, Davenport, Iowa.

IF you can write, you can draw professional cartoons. Information: Alphabet Art, 123-35PS 82nd, Kew Gardens 15, New York.

## 55 TYPEWRITERS & OFFICE MACHINES

TYPEWRITERS, Printing Duplicating Machines $25.00 up. Write Dixie Graph, King, N. C.

## 56 RUBBER STAMPS & OFFICE SUPPLIES

FREE—Rubber Stamp Catalog. Martins, 1425 Major Drive, Jefferson City, Missouri.

THREE line pocket rubber stamp, self-inking, $1.00. L. Watson, P.O. Box 162, St. Charles, Illinois.

SIGNATURE $3.50. Stock and special free literature. Dick's Stamp Shop, 1441 So. Clay, Jacksonville, Illinois.

FREE Type Style & Price Chart. Free stock stamp literature, Signature Stamps $3.50, Pads. 271 page Business Printing Catalog, Labels, Decals, $1.00. Youngers Stamps & Printing, Princeton, Iowa.

THREE Line pocket stamp with pad or office type. $1.00. W. Atherton, Box 61, Randolph, Massachusetts.

## 57 PRINTING, MULTIGRAPHING, ETC.

1,000 BUSINESS Cards, "Raised Letters" $3.95. Samples. Pioneer, PS3, Island Park, New York.

FREE Catalogs. Postpaid printing, Rubber stamps. D M Press, Sebastopol, Calif.

OFFSET Printing—24 Hour Service—$6.75—1000 8½x11, $18.50—5000. National Letter, 300 West 43rd St., New York City 36.

RAISED Letter Business Cards Like Engraved, $3.00 thousand. Free samples. Kavanagh, 607 Knickerbocker Ave., Brooklyn 21, N. Y.

LETTERHEADS, Billheads, Envelopes. Surprise deal. Free Samples. Okayprint, Martins Ferry, Ohio.

500 ¾x2¼ Four Line Stickers $1.00. Red Border $1.50. Moritz, 312 Tuscola, Saginaw, Mich.

LETTERHEADS, Circulars, etc. Price list. Valaitis, 1705 South 2nd, Phila. 10, Pa.

1000 ADDRESS Labels 88c, Three Line Pocket Stamp 88c. Business Printing, Free Catalog. Jordan's, 552 West O'Connor, Lima, Ohio.

1000 GUMMED Name & Address Labels $1.00. Perk's, Essex, Mass.

MIMEOGRAPHING, Offset Printing. Free samples. Pennsway, Drawer 1340, Scranton, Pa.

100 6¾ Envelopes. 100 5½x8½ Letterheads printed, $2.35. M. Fortney, R3, Dillsburg, Pa.

PRESSTIK Labels: Small quantities. Literature. Eddy, 7 Greenacres, West Hartford 7, Conn.

LETTERHEADS: 500—$4.50. Free Sample. Carlayne Printing, 1803 Fremont, Rapid City, South Dakota.

## 58 PRINTING OUTFITS, SUPPLIES

PRINTING Outfits, type, supplies. Send dime for illustrated supply book and samples. Kelsey, Inc., H-8, Meriden, Conn.

PRINTING Presses, Type, Supplies, Lists, 4c. Turnbaugh Service, Mechanicsburg, Pa.

MAKE Your Own self-molding rubber stamps and printing cuts. Plexirubber, Argyle 2, Wisconsin.

RUBBER Stamp Presses, Hydraulic Operated. Electrically heated. Sizes 5"x8", 8"x12", 10"x15", starting outfits, supplies, Printing Presses, Custom Manufacturing, 507 N. Jefferson, Springfield 2, Missouri.

PHOTO-Engravings: Line or Halftone, deep etch signature cuts. Wholesale price list. Products of California, Box 293-D, Stanton, California.

NOW! Do your own printing with guaranteed Sigwalt Presses proven since 1873. Complete selection of models and supplies. Literature free. Acme Type Foundry, 633 Plymouth, Chicago 5, Ill.

RUBBER Stamp Presses, Supplies. Kiewiet, 2025 Barney Road, Kalamazoo, Michigan.

## 59 PATENT ATTORNEYS

SHREWD or Amateurish? Professional inventors use only Patent Attorneys approved by Federal Government. $1.00 brings names approved attorneys near you. Approved, Box 1709, Grand Central Station, New York 17, New York.

## 60 FOR INVENTORS

PATENTS Skillfully Prepared for maximum commercial value with useful product development. High record of success in proving and claiming patentability. Valuable market service. Patents prepared and filed for service fee as low as $200.00. Send for self protecting invention record forms free. Patent search with valuable engineering report $15.00. Foreign patents filed at lower cost. Thirty Years established. Joseph O'Brien, Patent & Development Engineer, 132 Nassau Street, New York 38, N. Y.

WE have the markets if you have the ideas. Harvey Engineering, Cambridge 1, Maryland.

INVENTORS, if you have an invention for sale, patented or unpatented, write Institute of American Inventors, Dept. 30A, 635-F St., N.W., Washington 4, D. C.

INVENTIONS needed immediately for manufacturers. For additional information write Kessler Corporation, C-73-FI, Fremont, Ohio.

INVENTORS! Why be broke? Turn your invention into cash. If saleable, we can sell it. Write Universal Inventions, Box 298, Marion, Ohio.

INVENTORS: Save time and money. Prepare and file your own patent application. Our complete "Patent Kit" makes it easy. Includes detailed instructions and all necessary material. Only $5.95. Money back guarantee. Don't delay. Send check or money order today to National Inventors Service, Box 88, Ben. Franklin Station, Washington, D. C.

INVENTIONS Wanted for immediate promotion! Patented; unpatented. Outright cash; royalties! Casco, Mills Building, Washington 6, D. C.

PATENT Searches, $6.00, complete with comprehensive report and Official Patent Office copies of related patents. Certified, Airmailed. For free "Invention Protection Form," and "Patent Information," write: U.S. Inventors Service Bureau, Headquarters Building, Washington 6, D. C.

PROFESSIONAL Patent searches, $5.00, complete with report and related patent copies. Complete patent and trademark services. Free Forms; write: Congress Invention Institute, 210C McKim Building, Washington 5, D. C.

PATENT Searches including copies of nearest patents. $6.00. Reports airmailed within 48 hours. More than 200 registered patent attorneys have used my service. For Free invention protection forms. Write Miss Ann Hastings, P. O. Box 176, Washington 4, D. C.

CASH Or royalties for inventions! Patented; unpatented—All types considered. International, 1170 Broadway, New York 1, N. Y.

INVENTORS! Need help preparing sketches or completing details of your Invention? Searches, technical and patent drawings prepared for Inventors, Manufacturer's and Attorneys. Explain your problem—no obligation. "Tec-Pat" Associates, 5001 Dublin Ave., Wash. 23, D. C.

INVENTORS' Complete Service. Cash-Royalties Sales. Inventions Researched. Patent Development Engineering. Free Invention Certificate. George Spector, Licensed Invention Engineer, 3615 Woolworth Building, New York.

PATENT searches including copies of closest patents $6.00. Quality searches expertly administered. Free Protection Forms. Write Professional Patent Office Search Bureau, 709 Albee Building, Washington 5, D. C.





Copyrighted material

PATENT Searches, including complete copies of related patents, $6.00. Inventors, attorneys, manufacturers use my original "World-Wide" Airmail service. "Proof of Invention" protection form and "Information Every Inventor Needs" sent free! Miss Jane Hayward, 1029 Vermont Avenue N.W., Washington 5, D. C.

SAVE High fees! Apply for your Patent yourself. New "Do-It-Yourself" Patent Kit now makes it easy! Free "Registration Form." Miss Suzanne Blaine, 306 Carry Building, Washington 5, D. C.

QUALITY Patent Searches, $6.00. Complete patent office report forwarded. Free "Protection Certificate." American Patent Search Co., 422 Washington Blvd., Washington 5, D. C.

PROTECTION without patents or copyrights. Tekservice, 282 Woodcliff Station, North Bergen, N. J.

INVENTORS! Determine patentability of your invention. Searches of the Patent Office Records administered professionally —$6.00. For free invention protection forms, dependable service write Washington Patent Office Search Bureau, 1426 G Street, N.W., Washington, D. C.

DON'T pay high fees! Obtain U. S. Patent yourself. It's easy with "Professional Kit with Fill-In Forms." Free "Registration Form." Patent Protection Institute, 2000 P Street, N.W., Washington 5, D. C.

PROFESSIONAL searches of the Patent Office Records. Dependable. Reliable. $6.00 —For free protective forms write Trans-World Patent Service, 500 Walker Bldg., Washington 5, D. C.

INVENTORS! Consider our offer first before selling or licensing your invention on a cash or royalty basis. Patented. Unpatented. Write Inventions on Demand, 79 Wall Street, New York 5, N. Y.

INVENTORS! Outright cash sale or royalties for your inventions. Patented. Unpatented. Constant demand from our client manufacturers. Write United States Invention Brokerage, 78 Wall Street, New York 5, N. Y.

PATENTS Professionally Prepared for maximum commercial value. Patent Searches including report $6.00. Patents prepared as low as $195.00. Valuable market service with cash or royalty sales. 10 years dependable service. For free self-protecting Record of Invention forms write: H. Lawrence Blasius, Patent and Development Engineer, 15 Park Row, New York 38, N. Y.

YOU can easily apply for patents. Save with complete professional kit. Free registration kit. Patent Associates, 1213 Commonwealth Building, Philadelphia 7, Pennsylvania.

INVENTIONS wanted now by my Manufacturer Clients. Patented. Unpatented. Write Gilbert Adams, Patent Broker, 80 Wall Street, Financial District, New York City.

## 60A ENGINEERING SERVICES

INVENTION Development. Experimental equipment. Submit technical problems in confidence for no-cost survey. Todd Consulting Engineers, 424 West 119th, New York 27.

INVENTORS. Model builders. Antique Collectors. Electroplating and other metal finishing to meet your specifications. From one pin head to any size, shape or quantity. Will do usual or develop special finish for you. William Parker, 32 Westminster, Worcester, Mass.

## 61 INVENTIONS WANTED

INVENTORS: Hundreds of manufacturers have requested our assistance in locating marketable new products. Complete information free. Institute of American Inventors, Dept. 30C, 635-F Street, N. W., Washington 4, D. C.

ARE you interested in offers from reliable manufacturers for your invention? Patented, unpatented. Harvey Engineering, Cambridge, Maryland.

INVENTIONS wanted. Patented; unpatented. Tremendous Manufacturers lists. Global Marketing Service, 2420 77th, Oakland 5, Calif.

INVENTORS! Don't sell your invention, patented or unpatented, until you receive our offer. Write Universal Inventions, Box 298, Marion, Ohio.

INVENTIONS Wanted: "Patented"—"Patent Pending." 30 Years experience Promoting Inventions. National Service Bureau, 3122 Meramec, St. Louis 18, Missouri.

INVENTORS needing help with any problem, financial, development, securing manufacturer, obtaining patent. Write the organization that delivers action and results—not promises. Pioneer Inventions, 150 Broadway, New York 38, N. Y.

INVENTORS—Do you want to sell or license your invention on cash or royalty basis? Write Kessler Corporation, C-73-IW, Fremont, Ohio.

INVENTORS: Profit from your efforts. We Sell! Educational Booklet free. Inventors Idea Clinic, Dept. 15, Terminal Bldg., B-2616, Los Angeles 54, Calif.

CASH Or royalties for inventions! Patented; unpatented—All types considered. International, 1170 Broadway, New York 1, N. Y.

INVENTIONS Wanted for immediate promotion! Patented; unpatented. Outright cash; royalties! Casco, Mills Building, Washington 6, D. C.

INVENTORS' Complete Service. Cash-Royalties Sales. Inventions Researched. Patent Development Engineering. Free Invention Certificate. George Spector, Licensed Invention Engineer, 3615 Woolworth Building, New York.

INVENTORS Profit From Our Reliable Complete Assistance. Guide Book Tells What's Needed, Sell. Send $1.00. Inventors Creative Service, 354 South Spring, Los Angeles, California.

NAMES Of Manufacturers Wanting Inventions. Carlayne Service, 1803 Fremont, Rapid City, South Dakota.

INVENTORS! Outright cash sale or royalties for your inventions. Patented. Unpatented. Constant demand from our client manufacturers. Write United States Invention Brokerage, 78 Wall Street, New York 5, N. Y.

INVENTORS! Consider our offer first before selling or licensing your invention on a cash or royalty basis. Patented. Unpatented. Write Inventions on Demand, 79 Wall Street, New York 5, N. Y.

INVENTIONS wanted now by my Manufacturer Clients. Patented. Unpatented. Write Gilbert Adams, Patent Broker, 80 Wall Street, Financial District, New York City.

## 64 MODELS, MODEL SUPPLIES

SHIP Models. Most complete line in New England. Kits, fittings, plans, books, tools, engines, motors. Illustrated catalog 35c. James Bliss and Co., Inc., Dept. PS, 342 Atlantic Avenue, Boston 10, Massachusetts.

"POWER Drives Handbook"—36 pages illustrating many types motor drives for model autos, boats, displays, turntables, etc. Mail 25 cents cash, returnable first order $3.00 or more. Wilson's of Cleveland, Dept. PS, P. O. Box 8995, Ft. Lauderdale, Fla.

SHIP and yacht model fittings; blueprints. Send 40c for Illustrated catalog listing hundreds of items. A. J. Fisher, Inc., 1002-2 Etowah Ave., Royal Oak, Michigan.

SCALE Model materials for building model homes and architectural buildings of any type. ¼" and ⅛" scale. Send 35c for catalog. A & B Model Builders, 454-F Donovan Road, Kansas City, Kansas.

SAVE! Free Bargain Bulletins: Trains, Airplanes, Boats, Cars, Radio Control, Plastics. America's Hobby Center, 146PS West 22nd Street, New York 11, N. Y.

SHIP Model Kits and fittings: clippers, frigates, etc. Catalog, paint-tool list, book list, 25c. Model Shipways, Box 85, Bogota, New Jersey.

POWER Models. Unusual steam, gasoline and traction engines, fittings, metals. Loctite Sealant, Liquid takes place of Lock Washers. Comprehensive 100 page catalog $1.00. Charles Cole, Ventura, Calif.

ROCKET supplies 1961 catalog now available 20c. Sky Mfg. Co., Mineral Point, Pa.

ROCKETS: Easily built, fun to fly, amazing performance—1200' plus. Complete kit with three motors, $1.50. Free model rocket hand booklet if you order now. Estes Industries, 5505 Tejon, Denver 21, Colorado.

STEAM Engines, tractors, boilers, castings, prints. Catalog $1.00. Tiny Power, Junction City, Oregon.

## 65 HOME CRAFTSMAN

SKIL-CRAFTS — World's finest and largest collection of Leathercraft, Hobby Craft, Art & Craft Supplies. Free billfold or leathercraft kit with first purchase. Send 25c latest catalog. Skil-Crafts, Box 167-PS, Joplin, Missouri.

LEARN Jewelry Making at home. Inexpensive Art Metalcraft course teaches how to make all types cuff links, earrings, tableware, etc. of silver, gold, copper. Send postcard for free booklet. Interstate Training Service, Dept. L-2, Portland 12, Oregon.

GRANDFATHER clock movements, case plans, kits. Wholesale catalog 25c. Mason-Sullivan, Noroton 2, Conn.

FOUNDRYETTE, 2400° F. 1½ to 48 lb. capacity. Free Circular. Kansas City Specialties Co., Dept. S-3, Marysville, Kansas.

FREE. New Catalog. 2447 Plans, Patterns. World's greatest selection things to do. Make. Fun. Profit. Craftplans, 1322-B Wabash, Chicago 5.

101 PATTERNS of smart Gifts, Novelties, Shelves. Action windmills plus "Make Money Jig Sawing." $1.00. Mastercraft, 35S, 7041 Olcott, Chicago 31.

FREE "Do-It-Yourself" Leathercraft Catalog. Tandy Leather Company, Box 791, E39, Fort Worth, Texas.

FREE Sample!! Perma-Pelent, new one coat silicone formula. Corrects moisture problems on block, brick stucco, stone, asbestos siding and all above grade masonry surfaces on your home. Less than one cent per square foot applied. Perma-Stone Co., Desk 18, Columbus 11, Ohio.

FREE! Newest Leathercraft catalog. Larson, Dept. 1526, 820 S. Tripp, Chicago 24.

!!FREE!! Leathercraft catalog. Hundreds of new items. Write MacPherson Bros. Leather Company, Dept. A, 730 Mission St., San Francisco 3, Calif.

WOODCRAFT, Leather Kits, Figurines, Models, etc. Catalog 10c. Redi-Cut Crafts, 4733 W. Center, Milwaukee 10, Wisconsin.

KNOCKDOWN cedar chest and lumber. Catalog 25c. Bedford Lumber Company, Shelbyville, Tennessee.

WHITTLERS—5 Readi-Cut Soft Wood Animals, Instructions—$1.00. Old Whittler, La Crosse, Wisconsin.

NEW Flocking Method: Cover animal models, picture, etc., with furry surface. Complete Kit, nine colors, $2.95. KT Novelty Co., Box 305, Glen Head, New York.

SQUAREKNOTTERS: Make belts, handbags, lanyards, dog leashes, etc. Special offer! Beginner's book, catalog and quality cord samples 25c. P. C. Herwig Co., Dept. 71-P7, 39 Henry St., Brooklyn 1, New York.

PICTURE Frame Moulding, Squares and lumber. Kiln Dried Walnut, Cherry, Silver Maple. Midland Lumber Co., Box 262, Savannah, Mo.

## 66 DO IT YOURSELF

RECIPES for Beer, Wine, Hard Cider, Mead, and Champagne. $1.00. Burter, Box 348, Milton, Wisconsin.

LONG Lasting Shine—Leather Shoes. No messy polishes. Complete instructions $1.00. Fashion Shoe, 19 Hurd St., Lowell, Mass.

MOSAICS—learn new easy methods. Complete catalog, color charts, instruction manual 25c. House of Mosaics, 2012 Chapala, Santa Barbara, California.

BRONZE or Aluminum Grave Marker Plaques. Install Yourself. $14.95. Free Literature. Hagen Engraving, Northport, Michigan.

BURGLAR Alarm, Chevrolet, Ford. Plans $1.00, or kit $3.00, postpaid. Kasten, Box 93, Altenburg, Mo.

## 67 OLD GOLD, JEWELRY, WATCHES, ETC.

USED and new watches $2 up. Free List. Southern Watches, 5-PS So. Wabash, Chicago 3.

HIGHEST Cash For Old Gold, Jewelry, Gold Teeth, Watches, Diamonds, Silverware, Spectacles, Platinum, Mercury. Free information. Rose Refiners, Heyworth Bldg., Chicago 2.



Copyrighted material

COSTUME Jewelry Supplies. Settings, Rhinestone, etc. 88 page illustrated catalog, 30c. Milady, Box 1328 G.P.O., New York (1).

HIGHEST Cash Paid for Old Gold, Jewelry, Gold Teeth, Rings, Diamonds, Watches, Silver, Platinum. Mail Articles Today. Information Free. Chicago Gold Co., 6 E. Monroe, Dept. 2857, Chicago 3.

FREE Illustrated catalog. Jewelry-making parts, supplies, rhinestones. Unique merchandise. Fast service. Reasonable prices. Folsom's, Box 52, Medford 55, Massachusetts.

SWISS—Calendar, Men's wrist watch. 17 jewels, matching expansion bracelet—$18.95. 17 jewels extra flat luxury—$11.95. Ladies' 17 jewels, Bangle watch, smart model—$14.95, chrome/gold filled, direct to you from Switzerland. Direct Import Co., 220 Hooper St., Brooklyn 11, New York.

## 68 TOBACCO & PIPES

SMOKING Pipes Repaired. Free Price List. Vicarepairs, 75 Radford Street, Yonkers, N. Y.

REQUEST fine pipes catalog. Free. Hobert, 340 East Park, Huntington, Indiana.

## 69 FOR THE HOME

POSSIBLE to save several hundred dollars if planning to build new home. Send two dollars cash or money order for booklet: "Septic Tank Sewage Disposal and their problems," prepared by civil engineer, to: Development Engineering, 450 Twelfth Avenue, Seattle 22, Washington.

## 70 OF INTEREST TO WOMEN

HOME Typing: $65 week possible! Details, $1. Treasury, 709 Webster, New Rochelle PS-4, N. Y.

MAKE Money weaving rugs at home for neighbors on $89.50 Union Loom. Thousands doing it. Booklet free. Union Loom Works, Dept. 4, Boonville, N. Y.

DRESSES 24c; Shoes 39c; Men's suits $4.95; trousers $1.20. Better used clothing. Free catalog. Transworld, 164-H Christopher, Brooklyn 12, N. Y.

CANDLEMAKING & Decorating. Terrific Hobby, Great Busine$$. Learn fascinating molding, dipping, creating and decorating candles for year-'round demand—holidays, birthdays, weddings, anniversaries. All Events. Spare time fun & extra income now, expand to colorful candle shop later. No age limit. Write for Free Facts on home instruction method. Candle Institute, Dept. X277, Fallbrook, Calif.

LADIES: Earn up to $2.00 hour sewing babywear! No house selling! Send postcard to Cuties, Warsaw 14, Indiana.

BABY jumper-exerciser. Appropriate gift, birth to seven months. Literally entertains hundreds hours! Nationally known. Safe! Free literature, testimonials. Only $8.14. Satisfaction guaranteed or money back. Shurtliff Manufacturing, 225 South Tenth, Pocatello 1, Idaho.

SAVE Money—Imported Irish Linen Pillow Cases stamped for embroidery, choice of cross-stitch Leaves or cutwork Lily designs, regular price $3, special $2 pair, postpaid. Money Back Guarantee. One pair only per customer. Send $2 stating choice or write for Free catalog featuring Stamped Linens for Embroidery or Painting. Merribee, 16 West 19th St., Dept. 917, New York 11, N. Y.

## 71 FOR SALE MISCELLANEOUS

JUST Out!! New calculator makes stair building easy! Settings give riser, tread, run, clearance, and well opening dimensions for any stairs. Sturdy, pocket-size computer repays its cost first time used! $3.95 postpaid. No COD's. Money-back guarantee. Free Circular. Emmert Products, Box 221, Sycamore, Illinois.

UNCLAIMED Men's Shirts. Cleaned, Pressed, Ready-To-Wear, $5. Dozen. Fairview, 783 E. 180th St., Bronx, N. Y.

HANDWOVEN Harris Tweed only $1.40 per yard. Save 2 dollars per yard. Patterns and list free. Money refund guarantee. MacGillivray Company, Benbecula, Outer Hebrides, Scotland.

TROPHIES . . . Huge Selection, Low Prices, Free Engraving, All Sports, Money Back Offer, Free Catalog. Schoonovers, Water St., Elmira, N. Y.

## 72 WANTED TO BUY

OLD automobile manuals—catalogues. Pierce, 3517 Dollar Dr., Akron 19, Ohio.

QUICKSILVER, platinum, silver, gold. Ores analyzed. Mercury Terminal, Norwood, Massachusetts.

## 77 TREASURE FINDERS & GEIGER COUNTERS

TRANSISTOR Treasure Detectors, underwater detectors. Many models. Free catalog. Gardiner Electronics Co., Dept. 1, 2545 East Indian School, Phoenix, Arizona.

DISCOVER buried loot, sunken treasure, gold, silver, coins; battlefield and ghost town relics, with powerful transistorized locators pioneered and perfected by Goldak. Low as $79.50. Free, exciting information; literature on maps. The Goldak Co., 1540 West Glenoaks Blvd., Glendale 1, California.

TREASURE, Gold, Silver, Relics. Find them with new super detectors. Free information. Detectron, North Hollywood, Calif.

TRANSISTOR M-Scope locates buried coins, gold, relics. From $59.50; terms. Booklet, interesting customer comments free. Fisher Research, Dept. D-1, Palo Alto, Calif.

GOLD Diver's Manual with Treasure Catalogue, $2.00. Treasure Headquarters, Rye, New York.

AMAZING discovery—Nature's electronics utilized. Locate underground streams, caverns, gas, waterlines. Saves work. Fun for experiments. Details free. Stillwater, Box 337F, Morris Plains, N. J.

GOLD detectors. Very sensitive instruments $10.00. Decter, Box 353PS, Menard, Texas.

TREASURE! Map, Handbook, 25c. Locators. Howe, 811A Kansas, Atchison, Kansas.

SCIENTIFIC Gift for teenagers and adults. Electronic Treasure Finder—Easy to make kit or assembled models available; Geiger Counters and Mineralights. Free Literature. Electronic Applications Co., Dept. C, P. O. Box 8, Arlington 10, Virginia.

## 78 WATCH REPAIRING

WATCH and clock repairing books. Free catalog. North American, 2320-BC, Milwaukee, Chicago 47, Illinois.

WATCHES repaired, cleaned, $3.95 guaranteed. Lan's, 17 South Center, American Fork, Utah.

## 79 MISCELLANEOUS

MAKE Wines, Brandies, Cordials, Beer. Full Instructions. Trade Secrets $1.00. Rorick, Cincinnati 26, Ohio.

PIGEON Trouble? Trap Pests. Free Information. Johnson's, Waverly 1, Kentucky.

HERBS—State kind. Enclose stamped envelope. Box 542, Birmingham 1, Ala.

CATHOLIC statuary, books, Bibles—tremendous savings! Catholic House, Box 8486C, Philadelphia, Penna.

BALL Point Pen Refills. Blue. 10—50c, 25—$1.00, 100—$2.50, 1000—$15.00. Guaranteed. Specialties, 1515 N. Franklin, Colorado Springs, Colorado.

EXTRAORDINARY Books—10c! Free Catalogs! Mailway, 124 Stuyvesant Station, New York City 9.

MAKE Money. "Win Prize Contests" $50,000,000 Given Yearly. "Home Brewed Wines, Beers" Both Instruction Manuals $1.00. Roundstone, Rt. 51, Belle Vernon, Pennsylvania.

RECEIVE Samples, Magazines, Catalogs, Opportunities, 10c. Starr, B-218, Adkins, Texas.

BEER Lovers—Enjoy the heartier, natural flavor of home brew. You make for 5c quart. Old Bavarian recipe and instructions—$2.00. Humelco, Box 709B, Burbank, Calif.

RECEIVE Mails—Offers From Everywhere. Samples, Catalogues, Magazines, Bargains. Get Listed 25c. Rorick's, Cincinnati 26, Ohio.

RECEIVE—Import Catalogs! Circulars! Foreign Offers! Get Listed—25c. Importico, Box 202, Asheville, N. C.

BOOKS on antiques and their prices. Free circular! R. Warman, Publisher, Uniontown, Penna.

FREE Monthly List Of Selected Government Publications, Electronics, Automics, etc. Send 50c For Preaddressed Application Form. Publications, 5034 Blackstone, Chicago 15, Ill.

"HOMEBREWED Wines, Beers." Highest powered. Instruction manual—$1.00. Dean's, 109-PS West 42nd, New York 36, N. Y.

"FACTS To Know" about being what you desire, and getting what you want—sent free. Applied Christian Psychology, Inc. (Non-profit), Box 1924, Louisville 1, Ky.

OWN publishing office. Pays big. Details, sample publication, 25c. Big Ben, 26 Court, Brooklyn 1, N. Y.

ARTISTIC Movie Actress Photos. 12 for $2.00; Sample, 25c. M. Fortney, R3, Dillsburg, Pa.

## 79B SWAP

SWAP anything for anything, anywhere. World-wide Swap Club. Send $1 for membership form. Swap Club, Feurt Hill, Portsmouth, Ohio.

READ "Trading Post Magazine" 10c. Thorne's, 525 Dewey, Jackson 35, Michigan.

## 80 PERSONAL

"RULE Others with your Thoughts." Telepathy. (Adults.) Write: Clarion, Box 9309-S6, Chicago 90.

FREE catalog. Hundreds of Health Items. Write Peter's, 10806 Lamontier Ave., Cleveland 4, Ohio.

FREE 32-page catalog, best quality family health products. Topical Laboratories, Box 569, Glen Cove, New York.

ADULTS Only. Books Discussing Sex Variations. Free List. Welchel, Limited, Black Mountain 30, North Carolina.

$1000 IN savings tomorrow? $1 tells how. Philips, 14018 Santa Teresa, Houston 45.

MEXICAN Law. Attorney Ceniceros, Apto. 79-Cd. Juárez, Chih., Mexico.

UNIQUE Advice On All Problems, Business And Personal. All Correspondence Confidential. Ideas Unlimited, Box 63, West Sunbury, Penna.

SUPER memory overnight! Success guaranteed! Bijou, Box 1727-V, Hollywood 28, Calif.

HAVE You Outgrown gods and supernaturalism? Is all your concern for people? Then you are a Humanist! Welcome to American Humanist Association; local chapters, publications. Send $1 for 3 month trial membership (or $5 for year) to: American Humanist Association, Dep't PSM, Yellow Springs, Ohio.

JOIN Your Organization! Select suitable Lodge, Association, Club. Confidential details free: Aura, Central Valley, New York.

LOANS Entirely By Mail—$600 or Less. Repay in 24 monthly payments. Write: Budget Finance Co., Dept. I-21, 114 S. 17, Omaha 2, Nebr.

## 80A REMAILING SERVICE

ORLANDO — Kissimmee — Secret Mail Address, Undercover Remailing, Telegrams, Tropical Gifts, Fruit, Postcards, Telephone Service. Free Details. Stowell, P.O. 627, Kissimmee, Florida.

SECRET Mail Address. $3 Month. Hedgpeth, Box 830, Alhambra 24, California.

HAWAII, Denver, South Bend, Tucson, Minneapolis, etc. 25c. "VIA Associates," Box 2434-S, Washington 13, D. C.

REMAILS—50c Denver—K.C. weekly. W. Nash, Idalia, Colo.

## 80B LOANS BY MAIL

BORROW $100 to $600 by Mail. Quick, Easy, Private. No Co-Signers. Repay in 24 small monthly payments. For the amount you want write today to Dial Finance Co., 410 Kilpatrick Bldg., Dept. C-1, Omaha 2, Nebraska.

NEW! Borrow $800. Anywhere. Increased Loan Limit. Air Mail Service. Postal Finance, 374 New Brotherhood Building, Dept. 11A, Kansas City, Kansas.



Copyrighted material

# FOR REAL **JOB SECURITY** —GET AN **I.C.S.** DIPLOMA

"You can stop worrying, Jane. My job's secure now! And here's the insurance policy to prove it—my I.C.S. diploma!"

**This feeling of security is probably typical of every I.C.S. graduate. Because—as the job situation gets tighter, the man with I.C.S. training has the advantage.**

Why? Your I.C.S. diploma tells your present employer three important things: (1) You want to make the most of your present job. (2). You have the training you need for advancement. (3) You look for better ways of doing things *on your own.*

**What you do about your future is up to *you.* Do nothing and stay at your present job at the same old pay. Or earn an I.C.S. diploma in your spare time for *security, promotions, more pay!* Your first step is to mark the course that interests you in the coupon below, and mail it to us.**

### Three *Free* Booklets

We'll send you three interesting booklets: (1) "How to Succeed" is a career guide of helpful tips that point out many small things in your personality and behavior that can make the difference between success and failure; (2) A booklet telling you about the opportunities in the field of your choice; (3) Sample I.C.S. lesson.

### Costs *pennies* a day

Many an I.C.S. student has reported a substantial increase in pay after only a few months of training. By studying at home in your spare time, you pay yourself many times an hour more than you're now making. (One student reports—"My I.C.S. course was worth $95 an hour to me.")

**The security of your present job—or the success in finding the new job you've always wanted—is in *your* hands. Move ahead with I.C.S. training while others stay behind on the routine, small-pay jobs. Remember, your first step to security and success is to mail this coupon. Take a few minutes and do it *now.* Putting it off will put you further behind in the race for higher pay and real job security.**

**For Real Job Security—Get an I. C. S. Diploma! I. C. S., Scranton 15, Penna.** Accredited Member, National Home Study Council

## INTERNATIONAL CORRESPONDENCE SCHOOLS ICS

**BOX 81085C, SCRANTON 15, PENNA.** (In Hawaii, reply P.O. Box 418, Honolulu) (Partial list of courses)

Without cost or obligation, send me "HOW to SUCCEED" and the opportunity booklet about the field BEFORE which I have marked X (plus sample lesson):

**ARCHITECTURE and BUILDING CONSTRUCTION**
- ☐ Air Conditioning
- ☐ Architecture
- ☐ Arch. Drawing and Designing
- ☐ Building Contractor
- ☐ Building Estimator
- ☐ Carpenter Builder
- ☐ Carpentry and Millwork
- ☐ Heating
- ☐ Painting Contractor
- ☐ Plumbing
- ☐ Reading Arch. Blueprints

**ART**
- ☐ Commercial Art
- ☐ Magazine Illus.
- ☐ Sign Painting and Design'g
- ☐ Sketching and Painting

**AUTOMOTIVE**
- ☐ Automobile
- ☐ Auto Body Rebuilding and Refinishing
- ☐ Auto Engine Tuneup
- ☐ Auto Electrical Technician
- ☐ Diesel Engines

**AVIATION**
- ☐ Aero-Engineering Technology
- ☐ Aviation Engine Mech.
- ☐ Reading Aircraft Blueprints

**BUSINESS**
- ☐ Accounting
- ☐ Advertising
- ☐ Bookkeeping and Cost Accounting
- ☐ Business Administration
- ☐ Business Management
- ☐ Clerk Typist
- ☐ Creative Salesmanship
- ☐ Managing a Small Business
- ☐ Professional Secretary
- ☐ Public Accounting
- ☐ Purchasing Agent
- ☐ Real Estate Salesmanship
- ☐ Salesmanship
- ☐ Salesmanship and Management
- ☐ Traffic Management

**CHEMICAL**
- ☐ Analytical Chemistry
- ☐ Chemical Engineering
- ☐ Chem. Lab. Technician
- ☐ General Chemistry
- ☐ Oil Field Technology
- ☐ Pulp and Paper Making

**CIVIL ENGINEERING**
- ☐ Civil Engineering
- ☐ Construction Engineering
- ☐ Highway Engineering
- ☐ Professional Engineer (Civil)
- ☐ Reading Struc. Blueprints
- ☐ Sanitary Engineer
- ☐ Sewage Plant Operator
- ☐ Structural Engineering
- ☐ Surveying and Mapping
- ☐ Water Works Operator

**DRAFTING**
- ☐ Aircraft Drafting
- ☐ Architectural Drafting
- ☐ Drafting & Machine Design
- ☐ Electrical Drafting
- ☐ Electrical Engineer Drafting
- ☐ Industrial Piping Drafting
- ☐ Mechanical Drafting
- ☐ Sheet Metal Drafting

**ELECTRICAL**
- ☐ Electrical Appliance Servicing
- ☐ Electrical Engineering
- ☐ Electric Motor Repairman
- ☐ Elec. Engr. Technician
- ☐ Elec. Light and Power
- ☐ Practical Electrician
- ☐ Practical Lineman
- ☐ Professional Engineer

**HIGH SCHOOL**
- ☐ Good English
- ☐ High School Diploma
- ☐ High School General
- ☐ H. S. College Prep. (Eng'r'g & Science)
- ☐ High School Math
- ☐ High School Science
- ☐ Short Story Writing

**LEADERSHIP**
- ☐ Industrial Foremanship
- ☐ Industrial Supervision
- ☐ Personnel-Labor Relations
- ☐ Supervision

**MECHANICAL and SHOP**
- ☐ Diesel Engines
- ☐ Gas-Elec. Welding
- ☐ Heating and Air Conditioning
- ☐ Industrial Engineering
- ☐ Industrial Instrumentation
- ☐ Industrial Safety
- ☐ Machine Shop Practice
- ☐ Mechanical Engineering
- ☐ Plumbing and Heating
- ☐ Professional Engineer
- ☐ Quality Control
- ☐ Reading Shop Blueprints
- ☐ Refrigeration and Air Conditioning
- ☐ Tool Design ☐ Tool Making

**RADIO, TELEVISION**
- ☐ General Electronics Tech.
- ☐ Industrial Electronics
- ☐ Practical Radio-TV Eng'r'g
- ☐ Radio-TV Servicing
- ☐ TV Technician

**RAILROAD**
- ☐ General Railroad

**STEAM and DIESEL POWER**
- ☐ Combustion Engineering
- ☐ Power Plant Engineer
- ☐ Stationary Diesel Engr.
- ☐ Stationary Steam Engines

**TEXTILE**
- ☐ General

Name_____ Age_____ Home Address_____

City_____ Zone_____ State_____ Working Hours_____ A.M. to P.M._____

Occupation_____

Canadian residents send coupon to International Correspondence Schools, Canadian, Ltd., Montreal, Canada. . . . Special low monthly tuition rates to members of the U. S. Armed Forces.

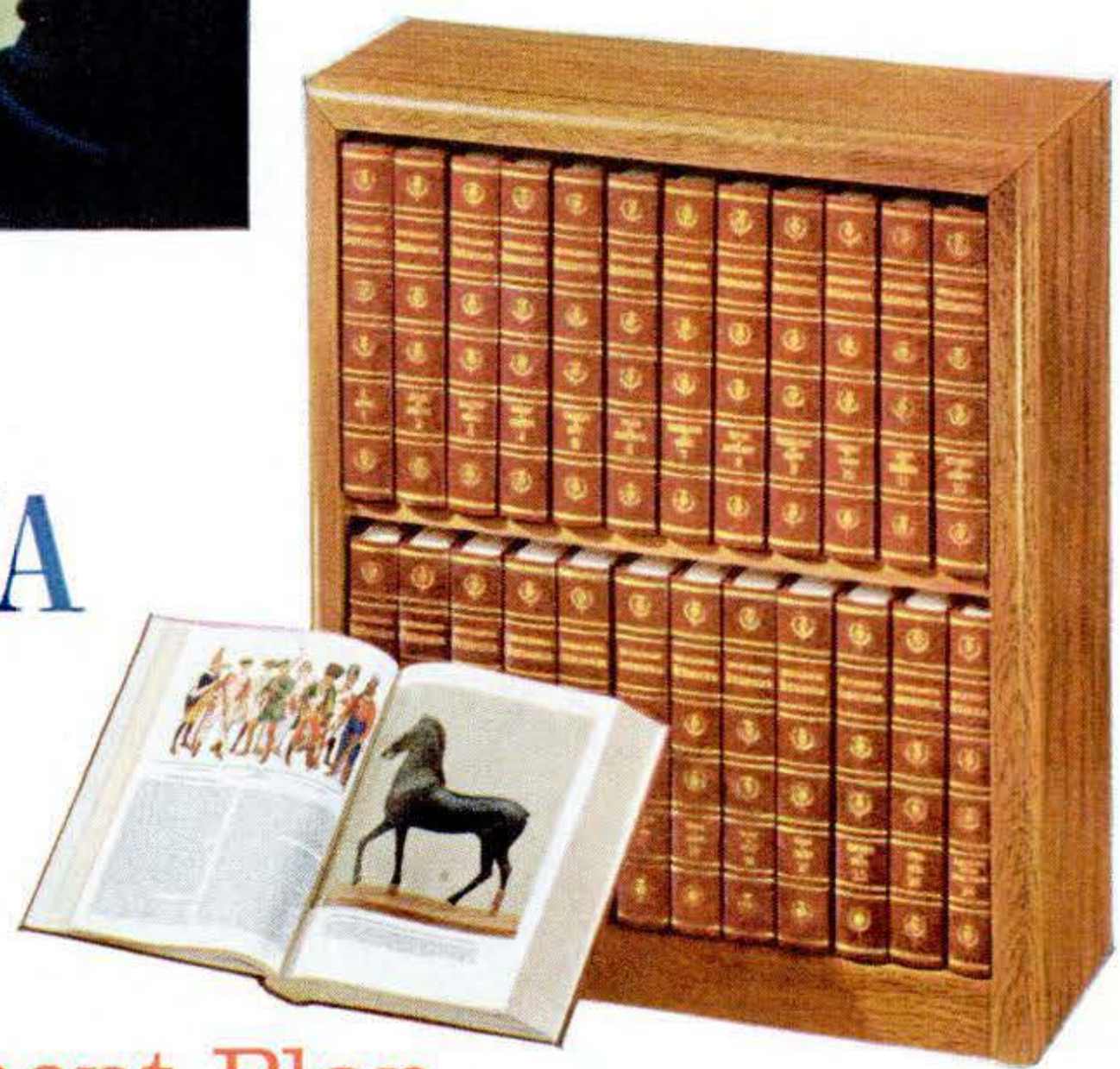


Copyrighted material

## When most people say "I think . . ." do they really think?

Our standing in any group depends in large part on the soundness of the opinions we express. A person who says "I think" and then expresses attitudes which are clearly not informed thoughts, but a jumble of emotional misinformation, is rarely listened to with respect. To think intelligently, one must have a background of knowledge against which current facts can be evaluated and sound opinions formed.

No one mind can hold all the information necessary to arrive at a thoughtful opinion on all subjects, but one reference set does—the esteemed Encyclopaedia Britannica, for almost 200 years the world's most respected, comprehensive, and authoritative treasure of knowledge. For anyone who recognizes the importance of expressing opinions which plainly show that when you say "I think" you are expressing real thought—not uninformed prejudice nor unthinking conformity—Encyclopaedia Britannica is an essential possession.



*New Edition*

# NCYCLOPAEDIA RITANNICA

*get all 24 volumes direct from publisher . . . pay later on the*

## ook a Month Payment Plan

latest edition of Britannica—reatest treasure of knowledge published—is the greatest in almost 200-year publishing ory. An *enormous printing* rially reduces our costs and r our unusual direct-from-ublisher plan, we pass these gs on to you. All 24 hand- volumes of this world-wned reference library will be ered to your home NOW *direct the publisher*. You pay later ost so low it is as easy as buy- book a month!

**Equivalent to a library of 1,000 books**

Encyclopaedia Britannica is ost valuable gift you can give yourself and your family—the priceless gift of knowledge. Contained in its pages is information on every subject significant to mankind. It is equivalent to a library of 1,000 books, bringing you the knowledge and authority of world-recognized leaders in every field. Think of a subject—and you'll find it in the Encyclopaedia Britannica—whether it is information on the rules of a sport, the background of a religion, how to build a brick arch in a fireplace, or the science of launching a guided missile.

The new Britannica almost "televises" information to you, with 25,042 magnificent photographs, maps, and drawings. In every respect, Britannica is the largest and most complete reference set published in America, containing 27,357 pages and over 38,000,000 words.

**Symbol of a good home**

Encyclopaedia Britannica cannot help but have a lasting effect on you as well as on the growth and development of your children in school and in later life. Benjamin Franklin said: "An investment in knowledge pays the best interest," and Britannica gives you the accumulated knowledge of the world in clear, easy-to-read language and superb illustrations. It is essential in every home where education is valued and respected.

MA
THI
FRE
POS
CAR
TOD

Copyrighted materia

# It's what's up front that counts

**FILTER-BLEND** up front, is the big taste difference, and only Winston has it! Rich, golden tobaccos specially selected and specially processed for full flavor in filter smoking. That's what makes Winston America's best-selling filter cigarette. Make your next pack Winston!

R. J. REYNOLDS TOBACCO CO., WINSTON-SALEM, N. C.

**WINSTON TASTES GOOD** *like a cigarette should!*

Copyrighted material